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A NATURALIST ON THE AMAZONS

H. W. BATES



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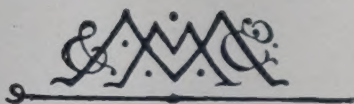
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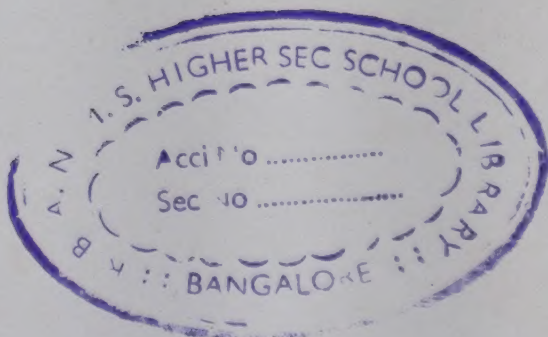
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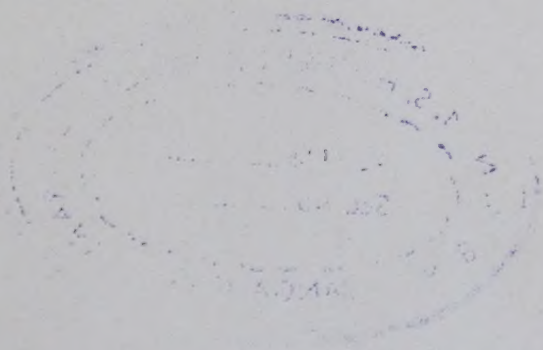
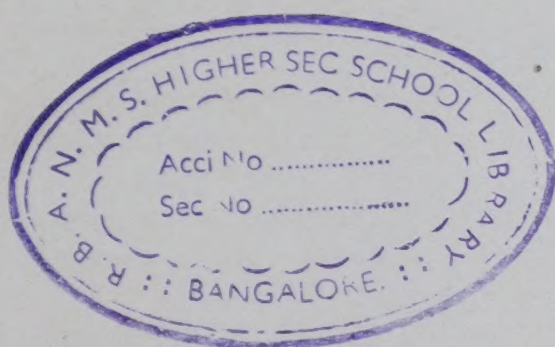
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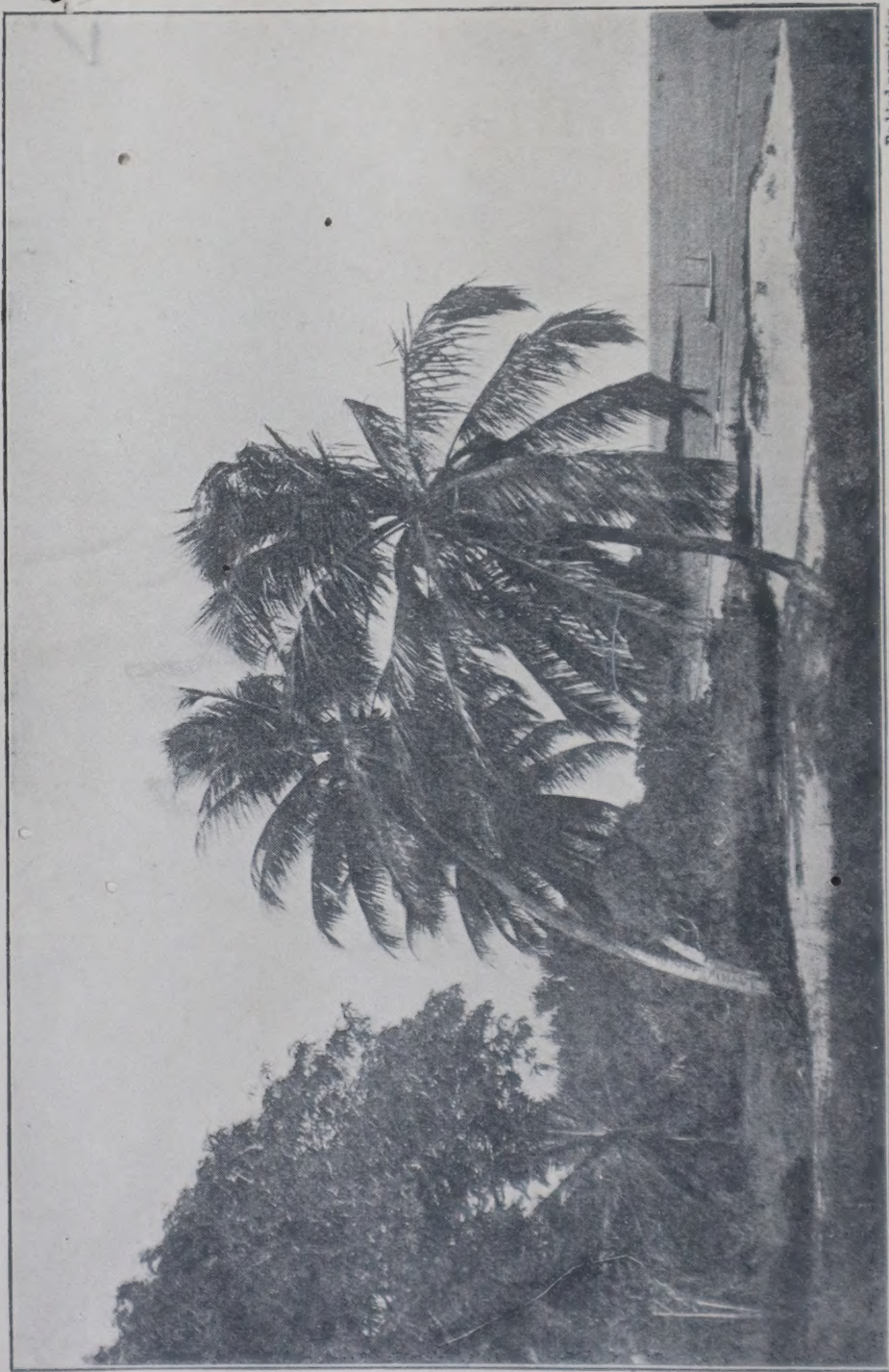


Photo by Miss E. Snelling, of Para, Brazil.

SOUTHERN MOUTH OF THE AMAZON (GUAJARA). A LITTLE BELOW PARÁ.

"Quem vai para Pará para." (Who goes to Pará stops there)

(Brazilian proverb quoted by Bates).

By kind permission.

A Naturalist on the Amazons

By
H. W. Bates

Abridged and Edited for Schools by
F. A. Bruton, M.A., Litt.D.
Assistant Master at Manchester Grammar School
Editor of White's "Selborne," etc.

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INTRODUCTION

The Author.

HENRY WALTER BATES, entomologist, naturalist, and explorer, whose notes on the regions of the Amazon are contained in this volume, was associated in his scientific work with the famous Alfred Russel Wallace, the co-discoverer with Charles Darwin of the Origin of Species by Natural Selection. The two naturalists met first at Leicester in 1844, and it was Bates who proposed a joint expedition to the Amazon, to collect natural history specimens; Wallace suggesting that they might at the same time gather facts "towards solving the problem of the Origin of Species."

In April, 1848, the two friends embarked at Liverpool in a small trading vessel; Wallace remained in South America four years only, but his companion did not return to England till late in 1859. Both travellers were unfortunate in losing valuable collections through fire or shipwreck; but some idea of Bates's industry may be gathered from the fact (the figures are given by Darwin himself) that in those of his collections which safely reached this country, there were represented no less than 14,712 distinct species, of which about 8000 were previously unknown to science.

Wallace published his *Travels on the Amazon and Rio Negro*, in 1853; Bates's *Naturalist on the Amazons* appeared just ten years later. The selections from this work which follow have reference mainly to the natural history of the Amazon forests; the writer's accounts of the towns he visited, and

of the various Indian tribes, are for the most part omitted. As the extracts are not arranged chronologically, but rather under headings following the principal divisions of the animal kingdom, it will probably conduce to a clearer understanding of the book if we first briefly sketch the author's route, (which may be followed on the accompanying map), and then add a few general notes on the great river whose basin he explored.

The Author's Route.

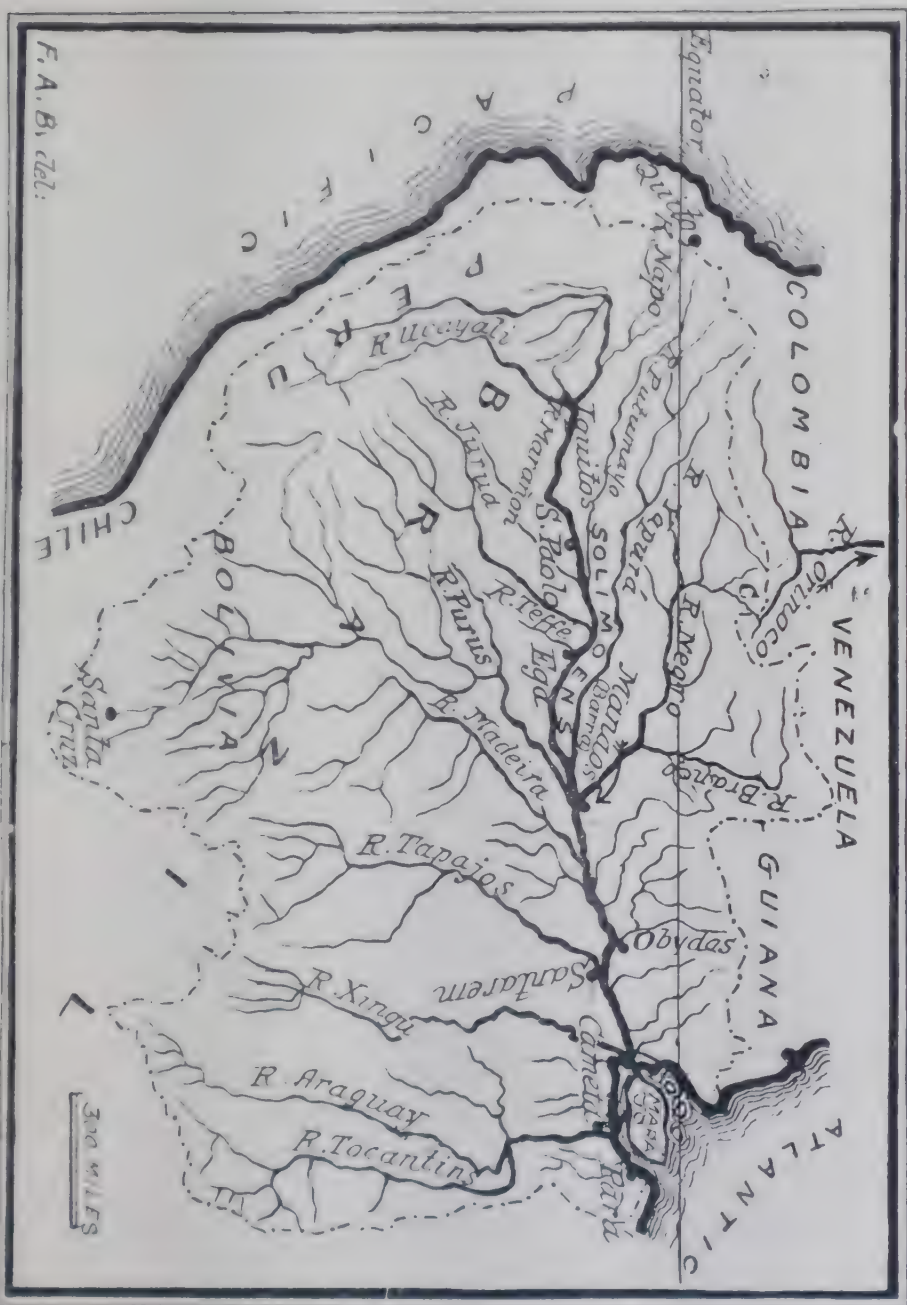
Bates landed at Pará, at the mouth of the Amazon, in May, 1848, and made this town his headquarters for eighteen months, during which time he sailed up the River Tocantins, visiting Cametá twice, and explored Caripí and the bay of Marajó. In November, 1849, he sailed for Manaos, at the mouth of the Rio Negro, (a river which Wallace explored by himself more in detail), and stayed for some weeks at Obydos. April, 1851, found him again at Pará, and six months later he made a second expedition to the Lower Amazon, this time choosing Santarem as his base; and such it remained for three years. From Santarem he voyaged southwards up the River Tapajos.

Later he pushed westwards to the Solimoens or Upper Amazon, making Ega his headquarters for no less than four and a half years. From Ega he made many excursions, proceeding as far up the river as S. Paolo, in west longitude $69\frac{1}{2}^{\circ}$. He was here less than a hundred miles from Peru, and it had been his intention to extend his explorations across that country to the foot of the Andes, but an acute attack of ague obliged him to descend once more to Pará, whence he finally set sail for England in June, 1859.

The Amazon.

The River Amazon has a drainage area of over 2,700,000 square miles, that is, more than half as large again as our whole Indian Empire; its basin lies wholly within the tropics.

THE AMAZON AND ITS TRIBUTARIES.



The dotted boundary outlines the Basin of the River approximately. Only places mentioned in the book are marked, except that Santa Cruz indicates the southern limit. The river drains two thirds of South America, from 5° N. to 20° S. latitude. Note especially: (1) the Napo, in the N.W. from which Orrellana descended the great River to the Atlantic in 1541, as related by Bates. (2) The Casiquiare (marked *), which connects the Amazon with the Orinoco. (A detailed map of the mouth of the Amazon follows later.)

The length of the river, from its remotest sources on the inter-Andean plateau to the Atlantic, must be close upon four thousand miles, and the main stream is navigable for ocean steamers as far as Iquitos, 2300 miles from the sea. With the exception of some low, table-topped mountains (figured by Bates in his book) the basin is one great plain, descending almost imperceptibly, at the rate of a few inches per mile, to the east. The velocity of the stream is, generally speaking, three miles, sometimes five miles an hour. The difference between the levels in the dry and rainy season is considerable; this great area of 20,000 square miles of water being raised annually as much as fifty feet.

“The simultaneous action of aqueous and volcanic forces, of submarine earthquakes and marine currents, has produced the marvellous regularity of surface, the gradual and imperceptible slope, which exist over this immense area. We see here the last stage of a process that has been going on during the whole period of the elevation of the Andes.” The climate of the region is one of the most equable on earth, and the forests are the most extensive in the world.

A Description and a Forecast.

As Bates's book appeared more than half a century ago, it is interesting to ask what travellers of to-day have to say about this region. Out of the numerous recent books on the subject we select the following passage, which is from the pen of Lord Bryce. His book on South America appeared in 1912. The extract is of interest as containing a hint as to the future of the great river-basin.

“The Selvas, or forest-covered Amazonian plain, includes nearly all the western half of Brazil, and the eastern parts of Bolivia, Peru, and Ecuador. An estimate of the area as 2,300,000 square miles, including the basin of the Tocantins river, might not be extravagant. It is an almost absolute level, 1200 miles from north to south, and 1500 wide. Those parts which lie along the great river and its larger tributaries are so low that these rivers, when they rise in the rainy season, spread out their waters for from sixty to eighty miles or more, on each side: and immense stretches of

country not actually flooded become impassable morasses. But away back from the rivers there are higher grounds, flat, but raised sufficiently to be above the inundations; and on its western margin the plain is bordered by a stretch of undulating country before the foot of the Andes is reached. All the country, whether level or undulating, is covered with forest. The trees grow so close that there is no way of travelling except by boat along the streams. Intense heat and abundant moisture combine to make vegetation so profuse and rank that ground cleared of trees is, after three or four years, covered thick again.

In this vast area there are, except in a few trading stations along the river, practically no inhabitants, perhaps not a human being to a square mile.¹ The few and scattered inhabitants outside these stations are Indians, nearly all savages, most of them heathens. Some are warlike and skilful in the use of their bows and of the long blow-pipe, from which they discharge poisoned darts, but the greater number are timid and feeble, an easy prey to the rubber-gatherers, who have in some places shewn themselves more cruel than the wildest Indian. Here and there, in Bolivia and Peru, there are a few cultivated districts in the undulating ground about the base of the Andes, where some sugar, coffee, and cocoa are raised. But the only product of commercial importance is rubber, collected from several kinds of trees, and exported in vast quantities down the tributary rivers into the Amazon, and thence to the sea.

The whole region, however, appears to be of extreme fertility, and to this the size of the trees, as well as the profusion of the vegetation, bears witness. Most of it is covered with vegetable soil, accumulated during many thousands of years, and has never been touched by human hand. As many of the woods are valuable, there might be a considerable trade in timber, but the cost of getting out great trees is practically prohibitive, for the trees are of so many different kinds that it is hard to obtain a large supply of the same kind on any given area, and there has hitherto been no means of transport except by water.

Can these Amazon Selvas, which form the largest unoccupied fertile space on the earth's surface, be reclaimed for the service of man? This question is not a practical one for our generation, but I mention it only because it raises *an interesting problem, the solution of which will one day be attempted, since so vast and fertile an area cannot be left for ever useless.*"

An Appreciation of the Author's Work.

Without claiming for the writer of this book exceptional powers of description or beauty of style, we shall not be exaggerating if we say that Bates's *Naturalist on the Amazons*, by its unconscious charm, holds the reader under a spell which is not cast by any other of the many books written about these regions. A fair test would be to ask how, after

¹ Bates's estimate was "one person to four square miles." ED.

Note on the Proper Names.

It will be noticed that a number of the proper names occurring in the text bear an acute accent on the final syllable. A simple general rule for the pronunciation of words of Spanish origin is as follows: Words ending in a consonant are stressed on the last syllable; words ending in a vowel are stressed on the last syllable but one; in such cases there is no written accent. But if the stress is to fall contrary to the general rule, an acute accent is written over the stressed syllable.

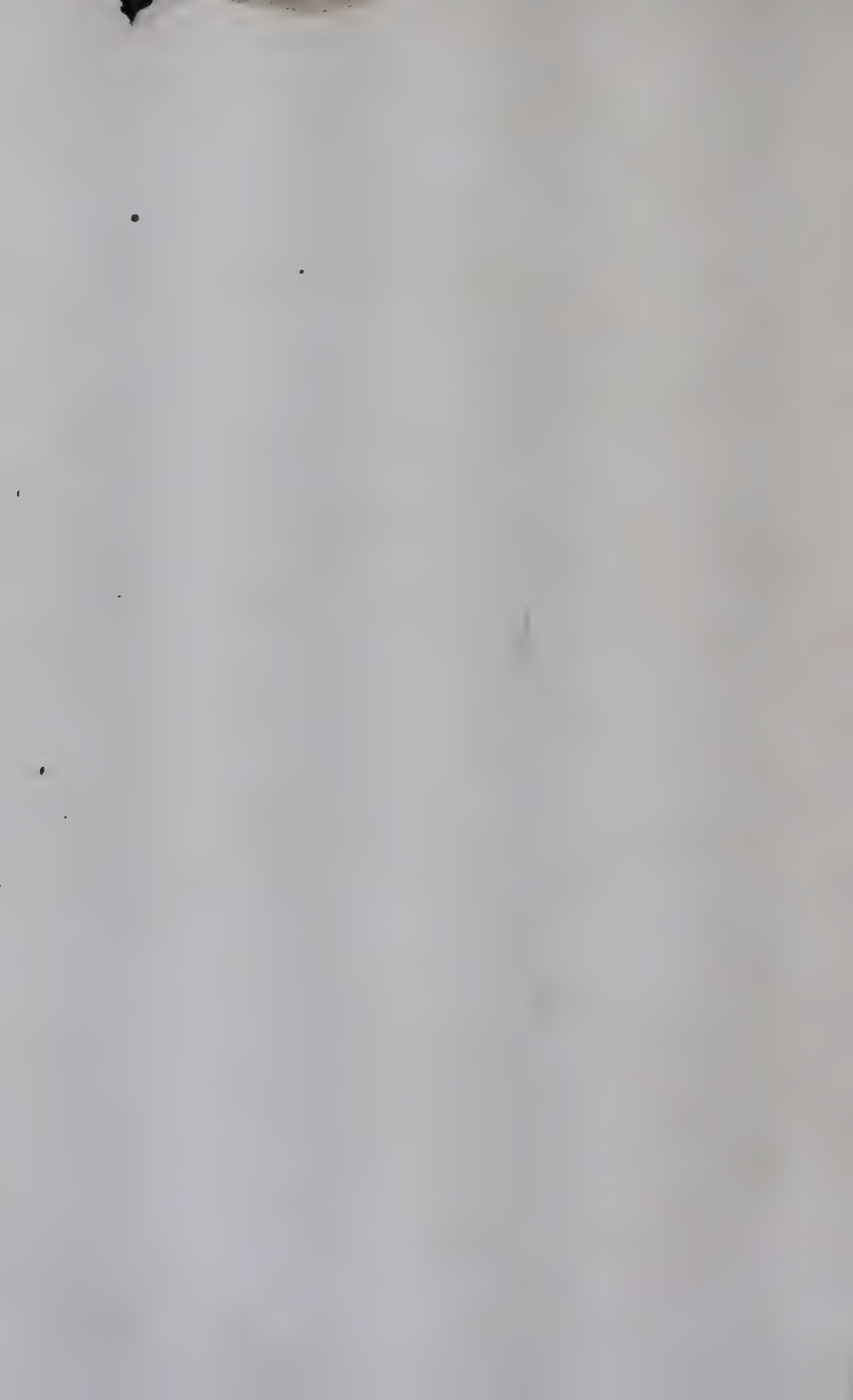
The name of the great river is now generally written *Amazon*. Bates, Wallace, and other early explorers, and many modern travellers, write *Amazons*. This form has therefore been retained in the text. Originally, there was no name for the main stream, each savage tribe giving a special name to its own section. It was Orellana who in 1541 christened the great artery the *Rio de las Amazonas*; hence the plural form.

The Illustrations.

It is a great pleasure to acknowledge the kindness of a number of friends who came forward to assist in the matter of illustrations directly they heard that Bates's famous work was to be made available for school use. The New York Zoological Society, who have done such important pioneer research in their own laboratories in the forests of South America, generously gave me permission, through their Secretary, Mr. W. T. Hornaday, D.Sc., to use a selection of pictures from their *Tropical Wild Life in British Guiana*, edited by Captain Beebe, who has returned to his labours after service with the American army at the front. With a single exception—the beautiful picture of the *Victoria Regia* by Captain Beebe—all the photographs from this source are by Mr. Paul G. Howes, Research Assistant at the Tropical

Research Station on the Mazaruni River, British Guiana. As already mentioned, Dr. W. T. Councilman of Boston, Massachusetts, very kindly sent a selection of negatives taken by himself on the Amazon, and Dr. Hamilton Rice of Rhode Island placed at our disposal his own photographs of the Rio Negro, at the same time pointing out that this stream contrasts in many respects with that of the main river. Permission was given to photograph objects (especially the fine collection of South American monkeys) in the Public Museums of Liverpool, through the Curator, Mr. J. A. Clubb, D.Sc. ; in the same way the objects in the museum of the Manchester Grammar School were available, permission being readily given by the High Master, Mr. J. L. Paton, M.A. ; and the photographs of all these are the result of the patient and painstaking work of Mr. R. L. Fletcher, amateur photographer, of Eccles. Dr. Graham Renshaw of Sale (several of whose photographs appear) gave permission for the use of the blocks of the Amazon Rail from the *Aviculturist*, of which he is editor. Mr. W. P. Dando's work as official photographer to the London Zoological Society is well-known ; the illustrations bearing his name are from living objects in the gardens at Regent's Park. The animals selected from the Manchester Grammar School collection were presented to the School by Mr. George Jennison of the Belle Vue Zoological Gardens. They have been mounted by Mr. J. W. Cutmore, Chief Taxidermist to the Liverpool Public Museums. Incidentally we have to thank Mr. W. M. Tattersall, D.Sc., Keeper of the Manchester Museum, and Mr. A. R. Hinks, Secretary of the Royal Geographical Society, London, for assistance willingly given. Lastly, (though the photograph stands first in the book), our best thanks are due to Miss E. Snethlage, of the Museu Goeldi (Museu Paraense), Pará, Brazil, for the beautiful production of her camera which forms the Frontispiece.

F. A. B.



A NATURALIST ON THE AMAZONS

CHAPTER I

FIRST IMPRESSIONS

Arrival

I EMBARKED at Liverpool, with Mr. Wallace, in a small trading vessel, on the 26th of April, 1848; and after a swift passage from the Irish channel to the Equator, arrived on the 26th of May, off Salinas. This is the pilot-station for vessels bound to Pará, the only port of entry to the vast region watered by the Amazons. Here the ship anchored in the open sea, at a distance of six miles from the shore. It was with deep interest that my companion and myself, both now about to see and examine the beauties of a tropical country for the first 10 time, gazed on the land where I, at least, eventually spent eleven of the best years of my life. To the westward, stretching towards the mouth of the river, we could see through the captain's glass a long line of forest, rising apparently out of the water, a densely packed mass of tall trees. This was the frontier, in this direction, of the great primeval forest characteristic of this region, which contains so many wonders in its recesses, and clothes the whole surface of the country for two thousand miles from this point to the foot of the Andes.

On the morning of the 28th of May we arrived at Pará. The appearance of the city at sunrise was pleasing in the highest degree. On landing, the hot moist



MOUTH OF THE AMAZON.

The mouth of the Pará is sometimes included as a southern mouth of the Amazon, and called Guajará.

mouldy air, which seemed to strike from the ground and walls, reminded me of the atmosphere of tropical stores at Kew. In the course of the afternoon a heavy storm fell, and in the evening, the atmosphere having been cooled by the rain, we walked about a mile out of town.

The impressions received during this first walk can never wholly fade from my mind. After traversing the few streets of tall, gloomy, convent-looking buildings near the port, inhabited chiefly by merchants and shopkeepers, along which idle soldiers, dressed in shabby uniforms, carrying their muskets carelessly over their arms, priests, negresses, with red water-jars on their heads, sad-looking Indian women carrying their naked children astride on their hips, and other samples of the motley life of the place, were seen—we passed down 10 a long narrow street leading to the suburbs.

The massive, dark crowns of shady mangos were seen everywhere, among the dwellings, amidst fragrant blossoming orange, lemon, and many other tropical fruit trees; some in flower, others in fruit, at varying stages of ripeness. Here and there, shooting above the more dome-like and sombre trees, were the smooth columnar stems of palms, bearing aloft their magnificent crowns of finely-cut fronds. On the boughs of the taller and more ordinary-looking trees sat tufts of curiously- 20 leaved parasites. Slender woody lianas hung in festoons from the branches, or were suspended in the form of cords and ribbons; whilst luxuriant creeping-plants overran alike tree-trunks, roofs, and walls, or toppled over palings in copious profusion of foliage. The superb banana, of which I had always read as forming one of the charms of tropical vegetation, here grew with great luxuriance; its glossy velvety-green leaves, twelve feet in length, curving over the roofs of verandahs in the rear of every house. 30

Strange forms of vegetation drew our attention at almost every step. Amongst them were the different

kinds of pine-apple plants, with their long, rigid, sword-shaped leaves, in some species jagged or toothed at the edges. Then there was the bread-fruit tree, remarkable from its large, glossy, dark green, strongly digitated foliage, and its interesting history

As we continued our walk the brief twilight com-



Photo by R. H. Fletcher

From the Manchester Grammar School Museum

SOUTH-AMERICAN BULL-FROG.

5½ inches long.

menced, and the sounds of multifarious life came from the vegetation around. The whirring of cicadas,¹ the shrill stridulation of a vast number and variety of field-
 10 crickets and grasshoppers, each species sounding its peculiar note; the plaintive hooting of tree-frogs—all blended together in one continuous ringing sound—the audible expression of the teeming profusion of nature. As night came on, many species of frogs and toads in the marshy places joined in the chorus; their croaking and drumming, far louder than anything I had before heard in the same line, being added to the other noises, created an almost deafening din. This uproar of life. I afterwards found, never wholly ceased, night or day: in
 20 course of time I became, like other residents, accustomed

¹ These numbers refer to the Notes at the end of the book

to it. After my return to England the deathlike stillness of summer days in the country appeared to me as strange as the ringing uproar did on my first arrival at Pará.

The object of our walk being accomplished, we returned to the city. The fire-flies² were then out in great numbers, flitting about the sombre woods, and even the frequented streets. We turned into our hammocks, well pleased with what we had seen, and full of anticipation with regard to the wealth of natural objects we had come to explore.

10

The life of the woods near Pará

The number and beauty of the birds and insects did not at first equal our expectations.³ The majority of the birds we saw were small and obscurely coloured; they were, indeed, similar, in general appearance, to such as are met with in country places in England. Occasionally a flock of small parroquets, green, with a patch of yellow on the forehead, would come at early morning to our trees. They would feed quietly, sometimes chattering in subdued tones, but setting up a harsh scream, and flying off, on being disturbed. Humming 20 birds we did not see at this time, although I afterwards found them by hundreds when certain trees were in flower. Vultures we only saw at a distance, sweeping round at a great height. Several flycatchers, finches, ant-thrushes, and tanagers⁴ inhabited the neighbourhood. None of these had a pleasing song, except a little brown wren, whose voice and melody resemble those of our English robin. Numbers of tanagers frequented the fruit trees. In their habits they resemble the common house-sparrow, of Europe, which does not 30

exist in South America, its place being in some measure filled by these familiar tanagers. They are just as lively, restless, bold, and wary; their notes are very



Photo by R. H. Fletcher

From the Manchester Grammar School Museum

KING-TODY FLYCATCHERS.

similar, chirping and inharmonious, and they seem to be almost as fond of the neighbourhood of man. They do not, however, build their nests on houses.

Another interesting and common bird was the Japín; it belongs to the same family of birds as our magpie, and has a rich yellow and black plumage, remarkably

compact and velvety in texture. It is social in its habits, and builds its nest, like the English rook, on trees in the neighbourhood of habitations. But the nests are quite differently constructed, being shaped



Photo by R. H. Fletcher

From the Manchester Grammar School Museum

TANAGERS.

like purses, two feet in length, and suspended from the slender branches all round the tree, some of them very near the ground. The bird is a great favourite with the Brazilians of Pará; it is a noisy, stirring, babbling creature, passing constantly to and fro, chattering to its comrades, and is very ready at imitating other birds, 10 especially the domestic poultry of the vicinity. There was at one time a weekly newspaper published at

Pará, called *The Japim*; the name being chosen, I suppose, on account of the babbling propensities of the bird.

Of other vertebrate animals we saw very little, except of the lizards. The species which are seen crawling over the walls of buildings in the city are different from those found in the forest or in the interior of houses. They are unpleasant-looking animals, with colours assimilated to those of the dilapidated stone and mud
10 walls on which they are seen. The house lizards belong to a peculiar family, the Geckos,⁵ and are found even in the best-kept chambers, most frequently on the walls and ceilings, to which they cling motionless by day, being active only at night. The structure of their feet is beautifully adapted for clinging to and running over smooth surfaces; the underside of their toes being expanded into cushions, beneath which folds of skin form a series of flexible plates. By means of this
• apparatus they can walk or run across a smooth ceiling
20 with their back downwards; the plated soles, by quick muscular action, exhausting and admitting air alternately. Sometimes Geckos are found with forked tails; this results from the budding of a rudimentary tail at the side, from an injury done to the member. A slight rap will cause their tails to snap off; the loss being afterwards partially repaired by a new growth. The tails of lizards seem to be almost useless appendages to the animals.

Next to the birds and lizards, the insects of the
30 suburbs of Pará deserve a few remarks. In the gardens numbers of fine showy butterflies were seen. There were two swallow-tailed species, similar in colour to

those in England. One day we made our first acquaintance with two of the most beautiful productions of nature in this department. They are of extremely delicate texture. The wings are cream-coloured; the hind pair have several tail-like appendages, and are spangled beneath as if with silver. Their flight is very slow and feeble, and in repose they close their wings over the back, so as to expose the brilliantly spotted under-surface.

I will pass over the many other orders and families 10 of insects, and proceed to the ants. These were in great numbers everywhere. We were amazed at seeing ants an inch and a quarter in length, and stout in proportion, marching in single file through the thickets. In our first walks we were puzzled to account for large mounds of earth, of a different colour from the surrounding soil, which were thrown up in the plantations and woods. Some of them were very extensive, being forty yards in circumference, but not more than two feet in height. We soon ascertained that these were the work of the 20 *Saüba*⁶ ants, being the outworks, or domes, which overlie and protect the entrances to their vast subterranean galleries.

The province of Pará is covered with forests, and the soil is fertile in the extreme. It is intersected throughout by broad and deep navigable rivers. It is the pride of the people to call the Amazons the Mediterranean of South America. The colossal stream perhaps deserves the name, for not only have the main river and its principal tributaries an immense expanse of water 30 bathing the shores of extensive and varied regions, but there is also throughout a system of back channels,

connected with the main rivers by narrow outlets and linking together a series of lakes, some of which are fifteen, twenty, and thirty miles in length. The whole Amazons valley is thus covered by a network of navigable waters, forming a vast inland freshwater sea with endless ramifications, rather than a river.



Photo by R. H. Fletcher, From the Liverpool
Public Museums By kind permission

FELINE DOUROUCOLI.

(*Nyctipithecus felinus.*)

Bates's "Night-ape."

CHAPTER II

IN THE FOREST PRIMEVAL

A naturalist's working day

WE now settled ourselves for a few months' regular work. We had the forest on three sides of us; it was the end of the wet season: most species of birds had finished moulting, and every day the insects increased in number and variety. After several days' exploration I found a series of pathways through the woods; the paths were very productive of insects, and being entirely under shade were very pleasant for strolling. Close to our doors began the main forest road. It was broad enough for three horsemen abreast, and branched off 10 in three directions. Our researches were made in various directions along these paths, and every day produced a number of new and interesting species. Collecting, preparing our specimens, and making notes, kept us well occupied. One day was so much like another, that a general description of the diurnal round of incidents, including the sequence of natural phenomena, will be sufficient to give an idea of how days pass to naturalists under the equator.

We used to rise soon after dawn, when our servant 20 would go down to the city, after supplying us with a cup of coffee, to purchase the fresh provisions for the day.

The two hours before breakfast were devoted to ornithology. At that early period of the day the sky was invariably cloudless (the thermometer marking 72° or 73° Fahrenheit); the heavy dew or the previous night's rain, which lay on the moist foliage, becoming quickly dissipated by the glowing sun, which rising straight out of the east, mounted rapidly towards the zenith. All nature was fresh, new leaf and flower buds expanding rapidly. Some mornings a single tree would appear in
10 flower amidst what was the preceding evening a uniform green mass of forest—a dome of blossom suddenly created as if by magic. The birds were all active; from the wild-fruit trees, not far off, we often heard the shrill yelping of the Toucans.⁷ Small flocks of parrots flew over on most mornings, at a great height, appearing in distinct relief against the blue sky, always two by two chattering to each other, the pairs being separated by regular intervals; their bright colours, however, were not apparent at that height. After breakfast we devoted
20 the hours from 10 a.m. to 2 or 3 p.m. to entomology; the best time for insects in the forest being a little before the greatest heat of the day.

The heat increased rapidly towards two o'clock (92° and 93° Fahrenheit), by which time every voice of bird or mammal was hushed; only in the trees was heard at intervals the harsh whirr of a cicada.¹ The leaves, which were so moist and fresh in early morning, now became lax and drooping; the flowers shed their petals. Our neighbours, the Indian and Mulatto inhabitants of
30 the open palm-thatched huts, as we returned home fatigued with our ramble, were either asleep in their hammocks or seated on mats in the shade, too languid

even to talk. On most days in June and July a heavy shower would fall some time in the afternoon, producing a most welcome coolness. All nature is refreshed, but



Photo by R. H. Fletcher

From the Manchester Grammar School Museum.

TOUCAN.

heaps of flower-petals and fallen leaves are seen under the trees. Towards evening life revives again; and the ringing uproar is resumed from bush and tree. The following morning the sun again rises in a cloudless sky, and so the cycle is completed; spring, summer, and autumn, as it were, in one tropical day. The days are more or less like this throughout the year in this 10 country. A little difference exists between the wet and dry seasons; but generally the dry season, which lasts

from July to December, is varied with showers, and the wet, from January to June, with sunny days.

In Europe, a woodland scene has its spring, its summer, its autumnal, and its winter aspects. In the equatorial forests the aspect is the same or nearly so every day in the year ; budding, flowering, fruiting, and leaf-shedding are always going on in one species or other. The activity of birds and insects proceeds without interruption, each species having its own separate times. It is never either spring, summer, or autumn, but each day is a combination of all three. With the day and night always of equal length ; with the sun in its course proceeding midway across the sky ; and the daily temperature the same within two or three degrees throughout the year—how grand in its perfect equilibrium and simplicity is the march of Nature under the equator !

Trees of the Forest

We were attracted chiefly by the colossal trees. The general run of trees had not remarkably thick stems ; the great and uniform height to which they grow without emitting a branch, was a much more noticeable feature than their thickness ; but at intervals of a furlong or so a veritable giant towered up. Only one of these monstrous trees can grow within a given space ; it monopolises the domain. and none but individuals of much inferior size can find a footing near it. The cylindrical trunks of these larger trees were generally about twenty to twenty-five feet in circumference. Von Martius ⁸ mentions having measured trees in the Pará district belonging to various species which were fifty



Photo by P. G. Howes

By kind permission of the New York Zoological Society

JUNGLE, SHOWING TOWERING HEIGHT OF GIANT MORA TREE.
Bates's "King-Tree."

to sixty feet in girth at the point where they became cylindrical. The height of the vast column-like stems could not be less than a hundred feet from the ground to their lowest branch ; the total height of these trees, stem and crown together, may be estimated at from 180 to 200 feet ; where one of them stands, the vast dome of foliage rises above the other forest trees as a domed cathedral does above the other buildings in a city. No representative of the coniferous trees is found
10 in the Amazon region.

A very remarkable feature in these trees is the growth of buttress-shaped projections around the lower part of their stems. The spaces between these buttresses, which are generally thin walls of wood, form spacious chambers, and may be compared to stalls in a stable ; some of them are large enough to hold half a dozen persons. These buttresses are the roots, which have raised themselves ridge-like out of the earth ; they are plainly intended to sustain the massive crown and
20 trunk in these crowded forests, where lateral growth of the roots in the earth is rendered difficult by the multitude of competitors. The roots of the Pashiúba palm grow above ground, radiating from the trunk many feet above the surface, so that the tree looks as if supported on stilts, and a person can stand upright among the roots.

Among the grand forest-trees whose native names we learnt were the King-tree and the Cow-tree. The latter is the more remarkable. We had already heard a great
30 deal about this tree, and about its producing from its bark a copious supply of milk as pleasant to drink as that of the cow. We had also eaten its fruit in Pará.

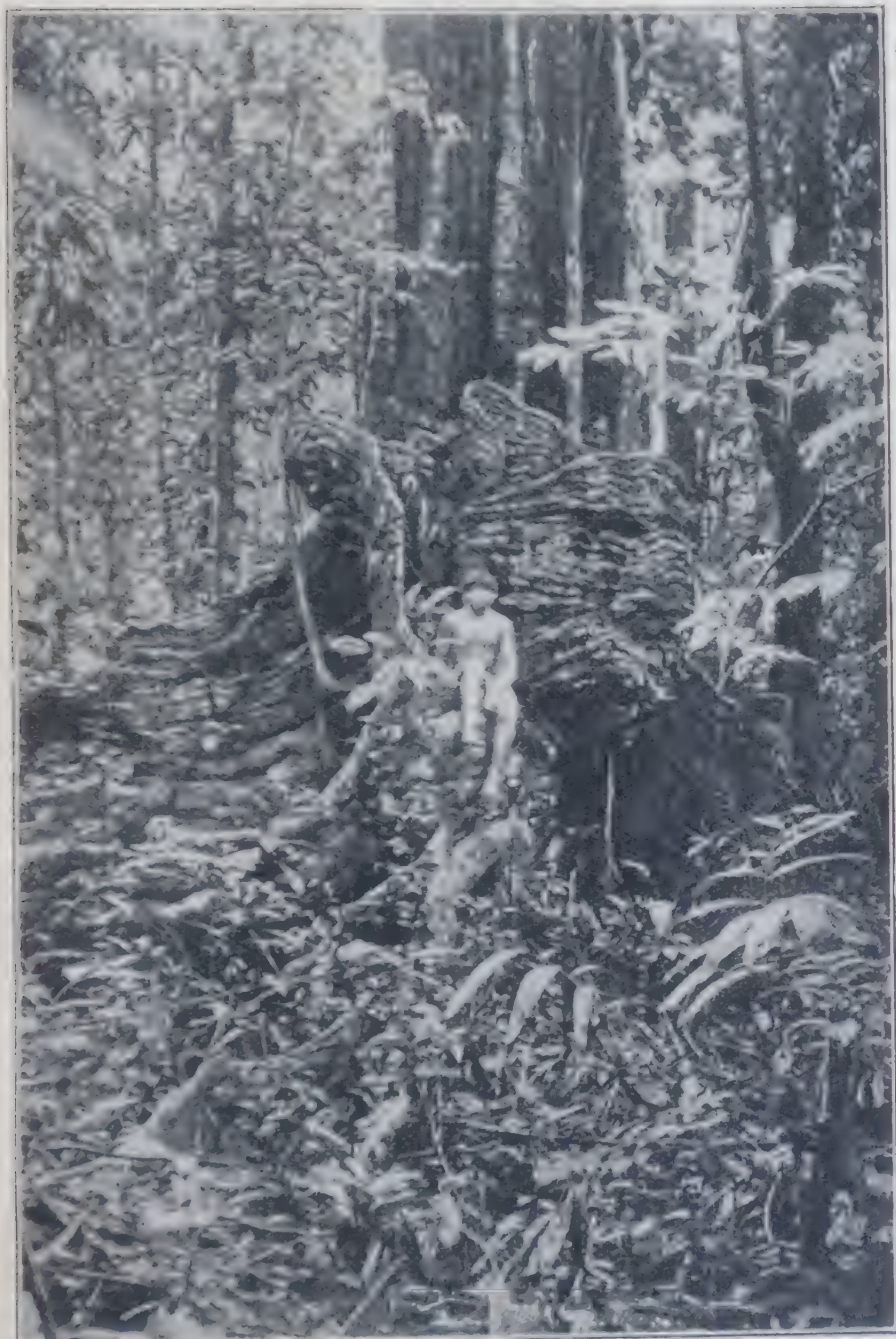


Photo by P. G. H. van

By kind permission of the New York Zoological Society

BUTTRESS-ROOTS OF THE GIANT MORA TREE.
Bates's "King-Tree."

where it is sold in the streets by negro market-women ; and had heard a good deal of the durableness in water of its timber. We were glad, therefore, to see this wonderful tree growing in its native wilds. It is one of the largest of the forest monarchs, and is peculiar in appearance on account of its deeply-scored reddish and ragged bark. A decoction of the bark, I was told, is used as a red dye for cloth. A few days afterwards we tasted its milk, which was drawn from dry logs that had
10 been standing many days in the hot sun, at the saw-mills. It was pleasant with coffee, but had a slight rankness when drunk pure ; it soon thickens to a glue, which is excessively tenacious, and is often used to cement broken crockery.

The low islands in mid-river are covered with a most luxuriant forest, comprising a large number of india-rubber trees. We found several people encamped here, who were engaged in collecting and preparing the rubber, and thus had an opportunity of observing the process.
20 The tree which yields this valuable sap belongs to a group of plants quite different from that which furnishes the caoutchouc⁹ of the East Indies and Africa. It grows only on the lowlands in the Amazons region, west of Pará, and as far as 1800 miles from the Atlantic coast. The tree is not unlike the European ash. The process is very simple. Every morning each person, man or woman, to whom is allotted a certain number of trees, goes the round of the whole and collects in a large vessel the milky sap which trickles from gashes made in the
30 bark on the preceding evening, and which is received in little clay cups, or in shells stuck beneath the wounds. The sap, which at first is of the consistence of cream, soon



Photo by Dr. W. T. Connelman

By kind permission

YOUNG PASHUBA PALM, SHOWING CHARACTERISTIC STILTS.

Figured and described by Bates.

thickens ; the collectors are provided with a great number of wooden moulds of the shape in which the rubber is wanted, and when they return to the camp they dip them into the liquid, laying on in the course of several days one coat after another. When this is done the substance is white and hard ; the proper colour and consistency are given by passing it repeatedly through a thick black smoke obtained by burning the nuts of certain palm trees, after which process the article is ready for sale.

- 10 Opposite Cametá the islands are all planted with cacao, the tree which yields the chocolate nut. The forest is not cleared for the purpose, but the cacao plants are stuck in here and there almost at random amongst the trees. The cacao tree produces a curious impression on account of the flowers and fruit growing directly out of the trunk and branches. In the wilderness, where the cacao is planted, the collecting of the fruit is dangerous from the number of poisonous snakes which inhabit the places.

Climbing plants

- The leafy crowns of the trees, scarcely two of which
20 could be seen together of the same kind, were far away above us, in another world, as it were. We could only see at times, where there was a break above, the tracery of the foliage against the clear blue sky. Sometimes the leaves were palmate, or of the shape of large, outstretched hands ; at others, finely cut or feathery, like the leaves of *Mimosae*.¹⁰ Below, the tree trunks were everywhere linked together by the woody, flexible stems of climbing and creeping trees, whose foliage was far away above, mingled with that of the taller independent trees. Some
30 were twisted in strands like cables, others had thick

stems contorted in every variety of shape, entwining snake-like round the tree trunks, or forming gigantic loops and coils among the larger branches ; others, again, were of zigzag shape, or indented like the steps of a staircase, sweeping from the ground to a giddy height.



Photo by R. H. Fletcher.

From the Manchester Grammar School Museum

SHORT PIECE OF A LIANA WITH THREE HORIZONTAL
SECTIONS.

It interested me much afterwards to find that these climbing trees do not form any particular family. There is no distinct group of plants whose especial habit is to climb, but species of many and the most diverse families the bulk of whose members are not climbers seem to 10 have been driven by circumstances to adopt this habit. There is even a climbing genus of palms ; these have slender thickly-spined and flexuous stems, which twine about the taller trees from one to the other, and grow to an incredible length. The number and variety of climbing trees in the Amazons forests are interesting,

taken in connection with the fact of the very general tendency of the animals, also, to become climbers.

Many of the woody lianas suspended from trees are not climbers, but the air-roots of epiphytous plants, which sit on the stronger boughs of the trees above, and hang down as straight as plumb-lines. Some are suspended singly, others in clusters; some reach halfway to the ground, and others touch it, striking their rootlets into the earth.

Palms

- 10 The forest was excessively varied. Some of the trees reared their heads far above the average height of the green walls. The fan-leaved Mirití palm was scattered in some numbers amidst the rest, a few solitary specimens shooting up their smooth columns above the other trees. The graceful Assai palm grew in little groups, forming feathery pictures set in the rounder foliage of the mass. The Ubussú, lower in height, showed only its shuttlecock-shaped crowns of huge undivided fronds, which, being of a vivid pale-green, contrasted forcibly against the
20 sombre hues of the surrounding foliage; the equally remarkable Jupatí palm occurred more sparsely, throwing its long shaggy leaves, forty to fifty feet in length, in broad arches over the water. An infinite variety of smaller palms decorated the water's edge.

The forest wall

"The forest wall"—I am extracting from my journal—"under which we are now moving, consists, besides palms, of a great variety of ordinary forest-trees. From the highest branches of these down to the water sweep ribbons of climbing plants of the most diverse and

Photo by Mr W T Gessellman

Low palm covered country, filled with deep canals, forming the communication between Para estuary and the Amazon. All tall palms here are the Miriti or Ita palm (*Mauritia flexuosa*).

By kind permission



ornamental foliage possible. Creeping convolvuli and others have made use of the slender lianas and hanging air-roots as ladders to climb by. Now and then appears a Mimosa or other tree having similar fine pinnate foliage, and thick masses of Inga border the water, from whose branches hang long bean-pods, of different shape and size according to the species, some of them a yard in



Photo by R. H. Fletcher.

From the Manchester Grammar School Museum.

ONE FRUIT OF CASSIA (below).

TWO OTHER LEGUMINOUS FRUITS (above).

One-foot scale in front.

length. Flowers there are very few; I see now and then a gorgeous crimson blossom. There are also a few
 10 yellow and violet trumpet flowers. The forest all along offers so dense a front that one never obtains a glimpse into the interior of the wilderness."

Forest cries

We often read, in books of travels, of the silence and gloom of the Brazilian forests. They are realities, and the impression deepens on a longer acquaintance. The few sounds of birds are of that pensive or mysterious

character which intensifies the feeling of solitude rather than imparts a sense of life and cheerfulness. Sometimes, in the midst of the stillness, a sudden yell or scream will startle one; this comes from some defenceless fruit-eating animal, which is pounced upon by a tiger-cat or stealthy boa-constrictor. Morning and evening the howling monkeys make a most fearful and



Photo by P G Howes.

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BEESEA MONKEY.*(? Pithecia Satanas. Bates's "Couxio.")*

harrowing noise, under which it is difficult to keep up one's buoyancy of spirit. The feeling of inhospitable wildness which the forest is calculated to inspire, is ¹⁰ increased tenfold under this fearful uproar. Often, even in the still hours of midday, a sudden crash will be heard resounding far through the wilderness, as some great bough or entire tree falls to the ground. There are, besides, many sounds that it is impossible to account for. With the native it is always the wild man or

spirit of the forest which produces all noises they are unable to explain.

It was in a remote and solitary spot on the Tapajos that I heard for the first and almost the only time the uproar of life at sunset, which Humboldt ¹¹ describes towards the sources of the Orinoco, but which is unknown on the banks of the larger rivers. The noises of animals began just as the sun sank behind the trees after a sweltering afternoon, leaving the sky above of the
10 intensest shade of blue. Two flocks of howling monkeys, one close to our canoe, the other about a furlong distant, filled the echoing forest with their dismal roaring. Troops of parrots, including the hyacinthine macaw, began then to pass over, the different styles of cawing and screaming of the various species making a terrible discord. Added to these noises were the songs of strange cicadas,¹ one large kind perched high on the trees setting up a most piercing chirp; it began with the usual harsh jarring
• tone of its tribe, but this gradually and rapidly became
20 shriller, until it ended in a long and loud note, resembling the steam-whistle of a locomotive engine. Half a dozen of these wonderful performers made a considerable item in the evening concert. The uproar of beasts, birds, and insects lasted but a short time: the sky quickly lost its intense hue, and the night set in. Then began the tree-frogs—quack quack, drum-drum, hoo-hoo: these, accompanied by a melancholy night-jar, kept up their monotonous cries till very late.

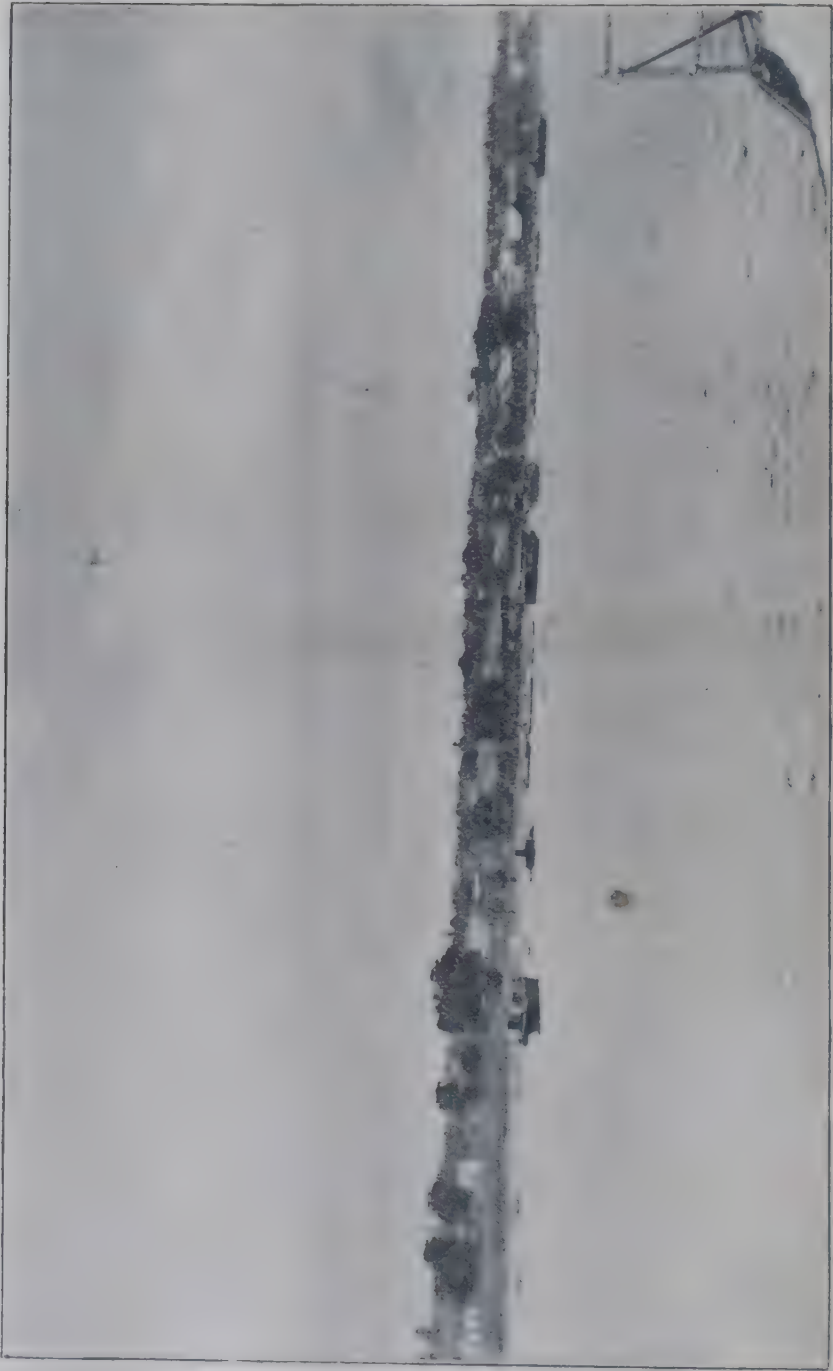
The abrupt ending of the dry season in the middle
30 of January seemed to give a new stimulus to animal life. The sea-breezes, which had been increasing in force for some days, suddenly ceased, and the atmosphere

became misty ; at length heavy clouds collected where a uniform blue sky had for many weeks prevailed, and down came a succession of heavy showers, the first of which lasted a whole day and night. On the first night there was a tremendous uproar—tree-frogs, crickets, goat-suckers, and owls all joining to perform a deafening concert. Sometimes the croaking and hooting of frogs and toads were so loud that we could not hear one another's voices indoors.

A Rest

At Santarem we used to make our halt in a cleared 10 place, tolerably free from ants and close to the water. Here we assembled after our toilsome morning's hunt in different directions through the woods, took our well-earned meal on the ground—two broad leaves of the wild banana serving us for a tablecloth—and rested for a couple of hours during the great heat of the afternoon.

The diversity of animal productions was as wonderful as that of the vegetable forms in this rich locality. It was pleasant to lie down during the hottest part of the day, when my people lay asleep, and watch the movement of 20 animals. Sometimes a troop of anus, a glossy black-plumaged bird, which lives in small societies in grassy places, would come in from the campos, one by one, calling to each other as they moved from tree to tree. Or a Toucan silently hopped or ran along and up the branches, peeping into chinks and crevices. Notes of solitary birds resounded from a distance through the wilderness. Occasionally a sulky trogon would be seen with its brilliant green back and rose-coloured breast, perched for an hour without moving on a low branch. 30



By kind permission

SANTAREM—LOWER TOWN.

Photo by Dr W. T. Councilman

A number of large fat lizards, two feet long, of a kind called by the natives Jacuarú, were always observed in the still hours of mid-day scampering with great clatter over the dead leaves, apparently in chase of each other. The fat of this bulky lizard is much prized by the natives. Other lizards of repulsive aspect, about three feet in length when full grown, splashed about and swam in the water; sometimes emerging to crawl into hollow



Photo by R. H. Fletcher

From the Manchester Grammar School Museum.

TWO FRUITS OF THE BRAZIL-NUT TREE.

One sawn in half.

trees on the banks of the streams where I once found a female and a nest of eggs. The lazy flapping flight of 10 large blue and black morpho butterflies high in the air, the hum of insects, and many inanimate sounds, contributed their share to the total impression this strange solitude produced.

Heavy fruits from the crowns of trees which were mingled together at a giddy height overhead fell now and then with a startling "plop" into the water. The breeze, not felt below, stirred in the topmost branches, setting the twisted and looped sipás in motion, which creaked and groaned in a great variety of notes. To these noises was 20 added the monotonous ripple of the brook, which had its little cascade at every score of yards or so of its course.

CHAPTER III

VOYAGING ON THE AMAZONS

Preparations

THE preparations for our first journey took a great deal of time and trouble. We had first to hire a two-masted vessel, twenty-seven feet long, with a flat prow and great breadth of beam and fitted to live in heavy seas; for although our voyage was only a river trip, there were vast sea-like expanses of water to traverse. The vessel was not decked over, but had two arched awnings formed of strong wickerwork, and thatched with palm leaves. We had then to store it with provision
10 for three months.

Sunrise on the Amazons

I shall ever remember, in one of my voyages along the Pará river, the grand spectacle that was once presented at sunrise. We were bounding along before a spanking breeze which tossed the waters into foam, when the day dawned. So clear was the air that the lower rim of the full moon remained sharply defined until it touched the western horizon, whilst at the same time the sun rose in the east. The two great orbs were visible at the same time, and the passage from the moonlit night to day

was so gentle that it seemed to be only the brightening of dull weather.

While approaching Cametá I was awakened at four o'clock in the morning to enjoy the sight of the little schooner tearing through the waves before a spanking breeze. The night was transparently clear and almost cold, the moon appeared sharply defined against the dark blue sky, and a ridge of foam marked where the prow of the vessel was cleaving its way through the water. The men had lit a fire in the galley to make tea. It is at 10 such times as these that Amazon travelling is enjoyable, and one no longer wonders at the love which many, both natives and strangers, have for this wandering life. The little schooner sped rapidly on with booms bent and sails stretched to the utmost. Just as day dawned, we ran with scarcely slackened speed into our port, and cast anchor.

Difficulties of sailing-vessels

At the time of my voyage to Obydos, namely in 1849, nearly all communication with the interior was by means of small sailing-vessels, owned by traders residing 20 in the remote towns and villages. The voyage made in this way was tedious in the extreme. When the regular east wind, the trade-wind of the Amazons, blew, sailing-vessels could get along very well; but when this failed they were obliged to remain sometimes many days together, anchored near the shore. In the dry season, from August to December, when the trade-wind is strong and the currents are slack, a schooner could reach the mouth of the Rio Negro, a thousand miles from Pará, in about forty days; but in the wet season, from January 30



Photo by Dr. W. T. Councilman.

By kind permission

“BEFORE A SPANKING BREEZE.”

Off Pará: Fishing boat returning with afternoon Trade-wind.

to July, when the east wind no longer blows, and the Amazons pours forth its full volume of water, flooding the banks and producing a heaving current, it took three months to travel the same distance. It was a great blessing to the inhabitants when, in 1853, a line of steamers was established, and this same journey could be accomplished, with ease and comfort, at all seasons, in eight days.

Discovery of the Amazons

It is perhaps not generally known that the Portuguese, as early as 1716, had a fair knowledge of the Amazons, 10 from various expeditions, the largest reaching Quito,¹² a distance of 2800 miles. The river was, however, discovered by the Spaniards in 1500, and nearly its whole course was navigated by Orellana in 1541-2. The voyage is one of the most remarkable on record. Orellana had accompanied the governor of Quito in an adventurous journey across the easternmost chain of the Andes, down into the sweltering valley of the Napo, in search of the land of El Dorado.¹³ The idea seized Orellana to commit himself to the chances of the stream, although 20 ignorant whither it would lead. So onward they went. From the Napo they emerged into the main Amazons, and after many and various adventures they reached the Atlantic, eight months from the date of their entering the great river.

Origin of the name Amazons

It was during this voyage that the nation of female warriors was said to have been met with; a report which gave rise to the Portuguese name of the river,

Amazons.¹⁴ It is now pretty well known that this is a mere fable, originating in the love of the marvellous which distinguished the early adventurers.

On the main stream

About midnight on October the 3rd the wind, for which we had been long waiting, sprang up, the men weighed anchor, and we were soon fairly embarked on the Amazons. I rose long before sunrise to see the great river by moonlight. There was a spanking breeze, and the vessel was bounding gaily over the waters. The
10 river had a most majestic appearance. It did not present that lake-like aspect which the waters of the Pará and Tocantins affect, but had all the swing, so to speak, of a vast flowing stream. The ochre-coloured turbid waters offered also a great contrast to the rivers belonging to the Pará system. The channel formed a splendid reach, with a horizon of water and sky both
up stream and down. Soon after sunset, as we were crossing the mouth of the first of the great tributaries of the Amazons, 1200 miles in length, a black cloud
20 arose suddenly in the south-west. All sails were taken in, and immediately afterwards a furious squall burst forth, tearing the waters into foam, and producing a frightful uproar in the neighbouring forests. A drenching rain followed ; but in half an hour all was again calm, and the full moon appeared sailing in a cloudless sky. The river is here ten miles broad ; and as we sailed along the southern shores the table-topped hills on the opposite side occupied most of our attention.

Photo by Dr W. T. Councilman



MANAOS (BARRA) FROM THE RIVER
(*i.e.* from the Rio Negro).

By kind permission

The Upper River

I must now take the reader from the picturesque hilly country to the boundless wooded plains and yellow turbid current of the Upper Amazons, or Solimoens. I embarked at Barra in 1850, three years before steamers were introduced on the Upper River, in a boat which was returning to Ega, the first and only town of any importance in the vast solitudes of the Solimoens. I shipped the collections I had made between Pará and the Rio Negro in a large cutter which was about descending
10 to the capital.

The rainy season had now set in over the region through which the great river flows; the sandbanks and all the lower lands were already under water, and the tearing current, two or three miles in breadth, bore along a continuous line of uprooted trees and islets of floating plants. The prospect was most melancholy; no sound was heard but the dull murmur of the waters; the coast along which we travelled every day was encumbered every step of the way with fallen trees,
20 some of which quivered in the currents which set around projecting points of land. This upper river, the Alto-Amazonas, or Solimoens, is always spoken of by the Brazilians as a distinct stream.

Three kinds of scenery

In passing slowly along the interminable wooded banks week after week, I observed that there were three tolerably distinct kinds of coast and corresponding forest constantly recurring on this upper river. First, there were the low and most recent alluvial deposits—

Photo by Dr W. F. Conclinn

CHARACTERISTIC LOW BANK: VARIED GROWTH.

(Upper Amazon.)

By kind permission



a mixture of sand and mud, covered with tall broad-leaved grasses, or with the arrow-grass, whose feathery-topped flower-stem rises to a height of fourteen or fifteen feet. Secondly, there were the moderately high banks, which are only partially overflowed when the flood season is at its height; these are wooded with a magnificent varied forest, in which a great variety of palms form a very large proportion of the vegetation. The general foliage is of a vivid light-green hue; one might
10 safely say that three-fourths of the land bordering the Upper Amazons, for a thousand miles, belong to this second class. The third description of coast is the higher, undulating clayey land, which appears only at long intervals.

Floating pumice

The fishermen twice brought me small rounded pieces of very porous pumice-stone which they had picked up floating on the surface of the main current of the river. They were to me objects of great curiosity, as being messengers from the distant volcanoes of the Andes
20 which rear their peaks amongst the rivulets that feed some of the early tributaries of the Amazons.

Land avalanches

Canoemen on the Upper Amazons live in constant dread of landslips, which occasionally take place along the steep earthy banks. One morning I was awakened before sunrise by an unusual sound resembling the roar of artillery. I was lying alone on the top of the cabin: it was very dark, and all my companions were asleep, so I lay listening. The sound came from a considerable



Photo by Dr. W. A. Connelman.

By kind permission.

HIGH BANK RECENTLY CAVED.

(The river is very deep close to the shore in all such cases.)

distance ; the first explanation that occurred to me was that it was an earthquake, for the broad river was much agitated, and the vessel rolled heavily. The day dawned after the uproar had lasted more than an hour, and we then saw the work of destruction going forward on the other side of the river, about three miles off. Large masses of forest, including trees of colossal size, probably 200 feet in height, were rocking to and fro, and falling headlong one after the other into the water. After
10 each avalanche the wave which it caused returned on the crumbly bank with tremendous force, and caused the fall of other masses by undermining them. It was a grand sight ; each downfall created a cloud of spray ; when we glided out of sight, two hours after sunrise, the destruction was still going on. ||

A calm night

The night before we reached Ega ¹⁵ it was not thought worth while to secure the vessel to the trees or cast anchor, as there was no current. I sat up for two or three hours after my companions had retired to rest,
20 enjoying the solemn calm of the night. Not a breath of air stirred ; the sky was of a deep blue, and the stars seemed to stand forth in sharp relief ; there was no sound of life in the woods, except the occasional melancholy note of some nocturnal bird. I reflected on my own wandering life ; I had now reached the end of the third stage of my journey, and was now more than half way across the continent. It was necessary for me, on
30 months or years. Would the neighbourhood of Ega

Photo by Dr. W. E. Connelmar



CHARACTERISTIC FOREST, UPPER AMAZON.

By kind permission

turn out to be suitable, and should I, a solitary stranger on a strange errand, find a welcome amongst its people ? A few days' experience of the people and the forests of the vicinity showed me that I might lay myself out for a long, pleasant, and busy residence here. I made Ega my headquarters for the four and a half years I remained on the Upper Amazons, and my excursions into the neighbouring region extended sometimes as far as three or four hundred miles from the place.

CHAPTER IV

FAUNA OF THE FOREST

MONKEYS

THIRTY-EIGHT species of monkeys inhabit the Amazon region. All the Amazonian, and, in fact, all the South American monkeys are climbers. There is no group answering to the baboons of the Old World, which live on the ground. The largest and most interesting portion of the Brazilian mammal fauna is arboreal in its habits, and the most *intensely* arboreal animals in the world are the South American monkeys, many of which have a fifth hand for climbing in their prehensile tails, adapted for the function by their strong muscular development, 10 and the naked palms under their tips. This seems to teach us that the South American fauna has been slowly adapted to a forest life, and, therefore, that extensive forests must have always existed since the region was first peopled by mammalia.

Marmosets ¹⁶ *of the Lower Amazon*

Monkeys were rare in the immediate vicinity of Pará. I met with three species only in the forests near the city ; they are shy animals, and avoid the neighbourhood of towns, where they are subject to much persecution by

the inhabitants, who kill them for food. The only kind which I saw frequently was the little *Midas ursulus*, one



Photo by R. H. Fletcher

From the Liverpool Public Museums
By kind permission

THREE COMMON MARMOSETS.

(*Haplé Jacchus*.)

The upper one carrying a baby.

of the Marmosets, a family peculiar to tropical America, and differing in many essential points of structure and habits from all other apes. They are small in size, and more like squirrels than true monkeys in their manner of climbing. The nails, except those of the hind thumbs, are long and claw-shaped like those of squirrels, and the thumbs of the fore extremities, or hands, are not opposable to the other fingers. I do not mean to imply that they

30 have a near relationship to squirrels, which belong to the Rodents, an inferior order of mammals; their resemblance to those animals is merely a superficial one.

They have two molar teeth less in each jaw than the *Cebidae*, the other family of American monkeys ; they agree with them, however, in the sideway position of the nostrils, a character which distinguishes both from all the monkeys of the Old World. The body is long and slender, clothed with soft hairs, and the tail, which is nearly twice the length of the trunk, is not prehensile. The hind limbs are much longer in volume than the anterior pair.

The *Midas ursulus* is never seen in large flocks ; three 10 or four is the greatest number observed together. The mode of progression along the main boughs of the lofty trees is like that of the squirrels ; it does not ascend to the slender branches, or take those wonderful flying leaps which the *Cebidae* do, whose prehensile tails and flexible hands fit them for such headlong travelling. It confines itself to the larger boughs and trunks of trees, the long tail being of great assistance to the creature, enabling it to cling securely to the bark ; and it is often seen passing rapidly round the perpendicular cylindrical 20 trunks. It is a quick, restless, timid little creature, and has a great share of curiosity, for when a person passes by under the trees along which a flock is running, they always stop for a few moments to have a stare at the intruder.

When full grown this monkey is about nine inches long, independently of the tail, which measures fifteen inches. The fur is thick, and black in colour, with the exception of a reddish-brown streak down the middle of the back. When first taken it is very timid and 30 irritable. It is always in a querulous humour, uttering a twittering, complaining noise : its dark, watchful eyes,

expressive of distrust, observant of every movement which takes place near it. When treated kindly, how-

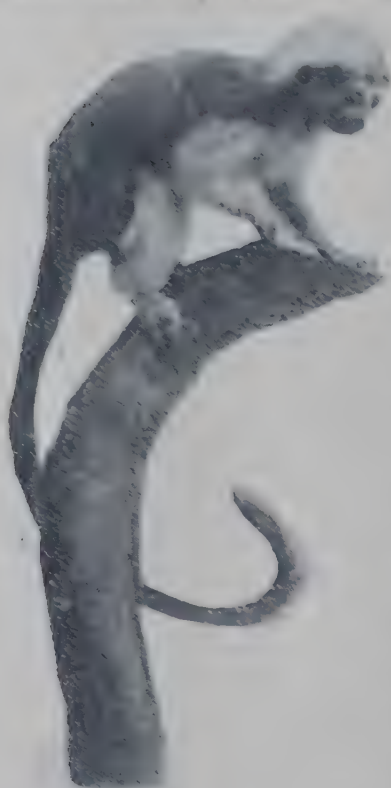


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PINCHE MARMOSET (Buffon).

(*Mico pinheiroi*.)

ever, as it generally is in the house of the natives it becomes very tame and familiar. I once saw one as playful as a kitten, running about the house after the negro children, who fondled it to their hearts' content. It is generally fed on sweet fruits, such as the banana; but it is also fond of insects, especially soft-bodied spiders and grasshoppers, which it will snap up with eagerness when within reach. The expression of countenance in these small monkeys is intelligent and pleasing.

The only monkeys I observed at Cameta were the Couxio — a large species clothed with brownish-black

hair—and the tiny Marmoset (*Mico argentatus*).¹ The Couxio has a thick bushy tail, and the hair of the head, which looks as if it had been carefully combed, sits on it like a wig. It inhabits only the most retired parts of the forest, and I observed nothing of its habits.

The little *Mico argentatus* is one of the rarest of the American monkeys; indeed, I have not heard of its

being found anywhere except near Cameta, where I once saw three individuals, looking like so many white kittens, running along a branch in a cacao grove; in their motions they resembled precisely the *Midas ursulus* already described. I saw afterwards a pet



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BLACK SAKI.

(*Pithecia satanas*.)

Bates's "Couxio" monkey.

animal of this species, and heard that there were many so kept and that they were esteemed as great treasures. The one mentioned was full grown, although it measured only seven inches in length of body. It was covered with long, white, silky hairs, the tail being blackish, to

and the face nearly naked and flesh-coloured. It was a most timid and sensitive little thing.

The woman who owned it carried it constantly in her bosom, and no money would induce her to part with her pet. She called it Mico. It fed from her mouth and allowed her to fondle it freely, but the nervous little creature would not permit strangers to touch it. If anyone attempted to do so it shrank back, the whole body trembling with fear, and its teeth chattered whilst
10 it uttered its tremulous frightened tones. The expression of its features was like that of its more robust brother, *Midas ursulus*; the eyes, which were black, were full of curiosity, and were always kept fixed on the person who attempted to advance towards it.

Spider-monkeys ¹⁷

The forest at Obydos seemed to abound in monkeys, for I rarely passed a day without seeing several. I noticed four species, including the Spider-monkey, and our old Pará friend, the Marmoset. The Spider-monkey is a large black creature, covered with coarse hair, and
20 having the prominent parts of the face of a tawny flesh-coloured hue. It is the largest of the Amazonian monkeys in stature, but is excelled in bulk by the Barrigudo monkeys of the Upper Amazons. The Spider-monkeys are so called on account of the length and slenderness of their body and limbs. In these apes the tail, as a prehensile organ, reaches its highest degree of perfection; and on this account it would, perhaps, be correct to consider these monkeys as the extreme development of the American type of apes. As far as
30 we know, from living and fossil species, the New World

has progressed no further towards the production of a

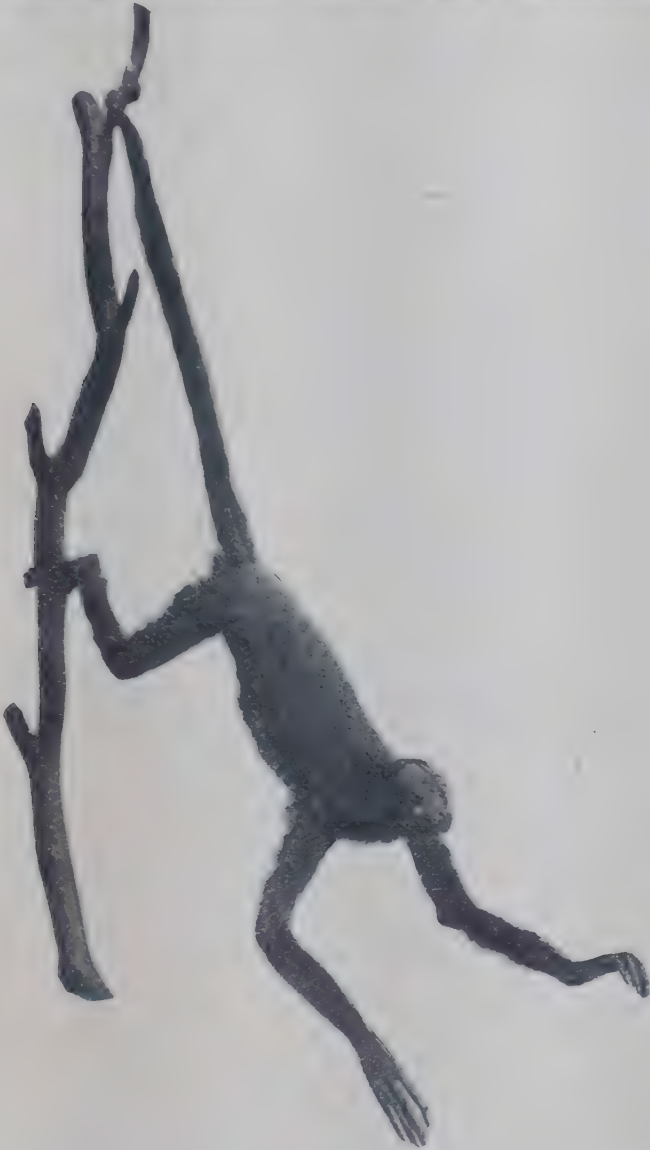


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BLACK SPIDER-MONKEY. (*Ateles ater*.)

Note use of tail as a fifth hand, and absence of thumb on forelimbs.

higher form of the monkey order. The tendency of nature here has been, to all appearance, simply to perfect

those organs which adapt the species more and more

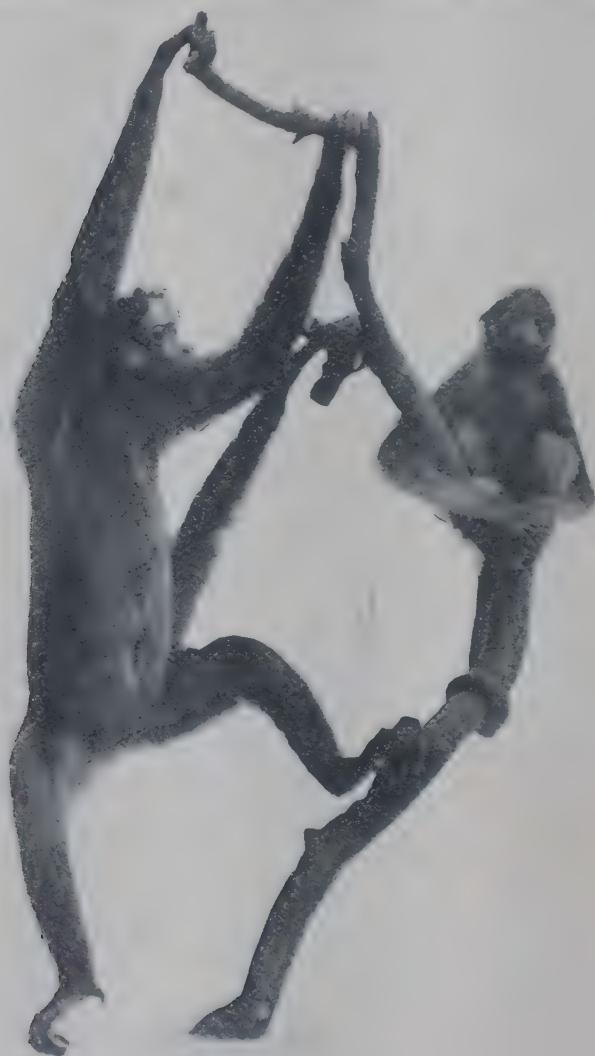


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TWO VARIEGATED SPIDER-MONKEYS.

(*Ateles variegatus*.)

(Note absence of thumb on forelimbs.)

completely to a purely arboreal life: and no nearer approach has been made towards the more advanced

forms of anthropoid apes, which are the products of the Old World solely.

The flesh of this monkey is much esteemed by the natives, and it is more frequently kept in a tame state than any other kind. The Indians are very fond of them as pets, and the women often suckle them when young at their breasts. I once saw a most ridiculously tame Spider-monkey. By way of giving me a specimen of its intelligence and feeling, its master set to and rated it soundly, calling it scamp, heathen, thief, and so on. 10 The poor monkey, quietly seated on the ground, seemed to be in sore trouble at this display of anger. It whined, and rocked its body to and fro with emotion, crying piteously. At length its master altered his tone. At once the poor monkey ceased its wailing, and soon after came over to where the man sat.

*Caiarara*¹⁸ monkeys

While voyaging on the Tapajos I heard that the white Caiarara monkey inhabited the forests on the river; we saw nothing of it, but met, however, the common light-brown allied species. This is pretty generally 20 distributed over the forests of the level country. I saw it very frequently on the banks of the Upper Amazons, where it was always a treat to watch a flock leaping amongst the trees, for it is the most wonderful performer in this line of the whole tribe. The troop consists of thirty or more individuals, which travel in single file. When the fore-branch of the forest reaches the outposts, he springs forth into the air without a moment's hesitation, and alights on the dome of yielding foliage belonging to the neigh- 30

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bouring tree, maybe fifty feet beneath; all the rest following the example. They grasp, on falling, with hand and tail, right themselves in a moment, and then away they go along branch and bough to the next tree.



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WEEPER-CAPUCHIN OR SAPAJOU (left).

(*Cebus capucinus*.)

GRIZZLED-CAPUCHIN (right).

(*Cebus annellatus*.)

Bates's "Caiarára" monkey.

This monkey is frequently kept as a pet in the houses of natives. I kept one myself for about a year, which accompanied me on my voyages and became very familiar, coming to me always on wet nights to share my blanket. It is a most restless creature, but is not playful like most of the American monkeys. It keeps the house

in a perpetual uproar where it is kept ; when alarmed, or hungry, or excited by envy, it screams piteously ; it is always, however, making some noise or other. My little pet, when loose, used to run after me, supporting itself for some distance on its hind legs, without, however, having been taught to do it. He offended me greatly one day, by killing, in one of his jealous fits, another and much choicer pet, the nocturnal owl-faced monkey.

Howling monkeys

The howlers are the only kind of monkeys which the natives have not succeeded in taming. They are often caught, but they do not survive captivity many weeks. One which I saw at Villa Nova had been brought from the river Madeira. It measured sixteen inches in length, exclusive of the tail ; the whole body was covered with rather long shining

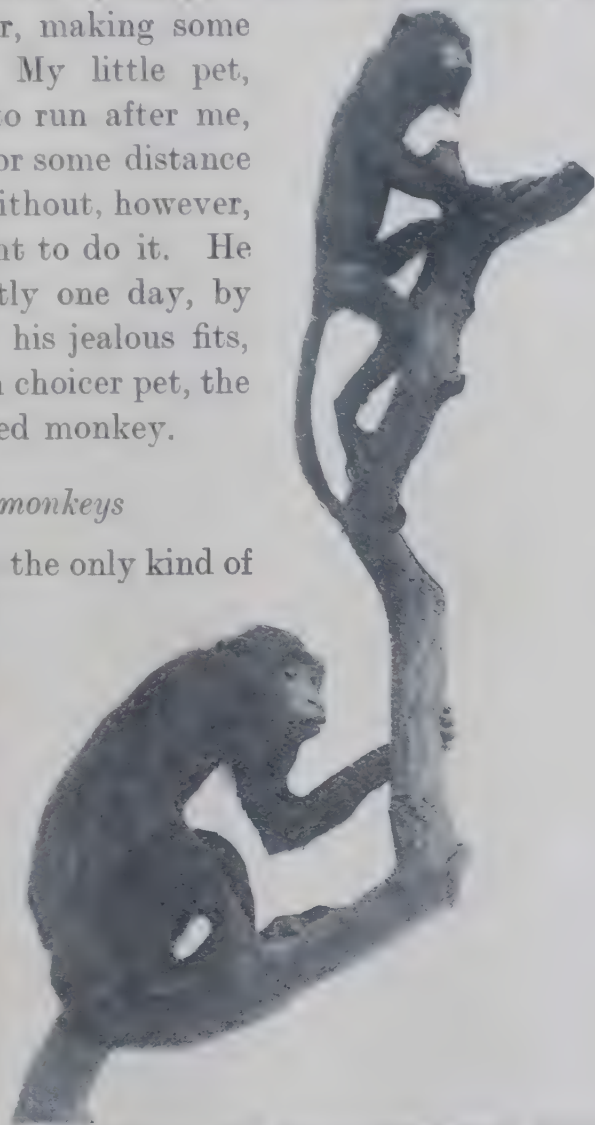


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BLACK HOWLER.

(*Alouatta nigra* or *Mycetes caraya*.)

Adult and young.

dingy-white hair, the whiskers and beard only being of a tawny hue. When it first arrived, it occasionally made a gruff subdued howling sound early in the morning.

The deep volume of sound in the voice of the howling monkeys, as is well known, is produced by a drum-shaped expansion of the larynx. It was curious to watch the animal whilst venting its hollow cavernous roar, and observe how small was the muscular exertion employed

10 When howlers are seen in the forest there are generally three or four of them mounted on the topmost branches of a tree. It does not appear that their harrowing roar is emitted from sudden alarm; it is probable, however, that the noise serves to intimidate their enemies.

Scarlet-faced monkeys ¹⁹

Early one summer morning, in the year 1855, I saw in the streets of Ega a number of Indians carrying on their shoulders down to the port, to be embarked on the Upper Amazons steamer, a large cage made of strong lianas, some twelve feet in length and five in height,

20 containing a dozen monkeys of the most grotesque appearance. Their bodies, about eighteen inches in height, exclusive of limbs, were clothed from neck to tail with very long, straight, and shining whitish hair: their heads were nearly bald, owing to the very short crop of thin grey hairs, and their faces glowed with the most vivid scarlet hue. As a finish to their striking physiognomy, they had bushy whiskers of a sandy colour, meeting under the chin, and yellow eyes. It was the first time I had seen this most curious of all

the South American monkeys; before leaving the country, however, I acquired two individuals, one of which lived in my house for several weeks.



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RED OR GOLDEN HOWLER.

Adult and young.

(*Alouatta seniculus* or *Mycetes seniculus*.)

The scarlet-faced monkey differs from all its relatives in having only the rudiment of a tail ; it was so unusual to see a nearly tailless monkey from America. that



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REED TITI.

(*Callithrix cinerascens*.)

Bates's "Whaiápu-sai" monkey.

naturalists thought, when the first specimens arrived in Europe, that the member had been shortened artificially. The tail reaches its perfection in those genera

(the Howlers and the Spider monkeys) in which it presents on its under-surface near the tip a naked palm which makes it sensitive and useful as a fifth hand in climbing. The scarlet-faced monkey lives in forests which are inundated during a great part of the year, and is never known to descend to the ground, the shortness of its tail is therefore no sign of terrestrial habits, as it is in the baboons of the Old World. It is pretty nimble in its motions, but is not much given to leaping. The mother, as in other species of the monkey order, 10 carries her young on her back. After seeing much of the morose disposition of this monkey, I was not a little surprised one day at a friend's house to find an extremely lively and familiar individual of the species. It ran from an inner chamber straight towards me after I had sat down on a chair, climbed my legs and nestled in my lap, turning round and looking up with the usual monkey's grin, after it had made itself comfortable. There are few animals which the Brazilians of these villages have not succeeded in taming. I have even 20 seen young jaguars running loose about a house, and treated as pets. When I descended the river in 1859, we had with us a tame scarlet-faced monkey, which was allowed to ramble about the vessel, a large schooner. When we reached the mouth of the Rio Negro, we had to wait four days, and during this time the schooner lay close to the shore, with its bowsprit secured to the trees on the bank. One morning scarlet-face was missing, having made his escape into the forest. We gave up the monkey for lost, until the following day, when he 30 reappeared on the outskirts of the forest, and marched quietly down the bowsprit to his usual place on deck.

Parauacú monkey

Another Ega monkey, nearly related to the scarlet-faced, is the Parauacú, a timid inoffensive creature, with a long bear-like coat of harsh speckled-grey hair.



Photo by R. H. Fletcher.

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MASKED TITI.

(*Callithrix sersonata*. Geoffr.)

Bates's "Whaiápu-sai" monkey.

I saw no monkey that shewed so strong a personal attachment as this gentle, timid, silent little creature; although a dull, cheerless animal, it excels all in this quality of capability of attachment to individuals of our own species. One of the specimens now in the

British Museum was, when living, the property of a neighbour of mine at Ega. My neighbour had quitted his house one morning without taking Parauacú with him, and the little creature having missed its friend, and



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HUMBOLDT'S SAKI.

(*Pithecia monachus*.)

Adult and Young.

Bates's "Parauacú" monkey.

concluded, as it seemed, that he would be sure to come to me, both being in the habit of paying me a daily visit together, came straight to my dwelling, taking a short cut over gardens, trees, and thickets, instead of going the roundabout way of the street. It had never done this before. On arriving at my house and not 10

finding its master, it climbed to the top of my table, and sat with an air of quiet resignation waiting for him. Shortly afterwards my friend entered, and the gladdened pet then jumped to its usual perch on his shoulder.

Night-apes

A third interesting genus of monkeys found near Ega are the night-apes. They sleep all day long in hollow trees, and come forth to
 10 prey on insects and eat fruits only at night. They are of small size, the body being about a foot long, and the tail fourteen inches, and are thickly clothed with soft grey and brown fur,
 20 similar in substance to that of a rabbit; their physiognomy reminds one of an owl, or tiger-cat. I kept a pet animal of this species for many months. Although sleeping by day, these monkeys are aroused by the least noise; so that when a person passes by a tree in which a number of them are concealed, he is startled by the sudden apparition of a group of little striped faces crowding a
 30 hole in the trunk. My own pet was kept in a box, in



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FELINE DOUROCOLI.

(*Nyctipithecus felinus*.)

Bates's "Night-ape."

which was placed a broad-mouthed glass jar ; into this it would dive head-foremost, when anyone entered the room, turning round inside, and thrusting forth its inquisitive face an instant afterwards to stare at the intruder. It was very active at night, venting at frequent intervals a hoarse cry, and scampering about the rooms after cockroaches and spiders. I was told by persons who had kept these monkeys loose about the house, that they cleared the chambers of bats as well.

Barrigudo monkeys ²⁰

Ten other species of monkeys were found in the forests 10 of the Upper Amazons. All were strictly arboreal and diurnal in their habits, and lived in flocks, travelling from tree to tree, the mothers with their children on their backs. The most remarkable is the Barrigudo monkey of the Portuguese colonists. This genus is closely allied to the Spider-monkeys, having, like them, extremely strong and flexible tails, which are furnished underneath with a naked palm like a hand, for grasping. I sent home a very large male of these, which measured twenty-seven inches in length of trunk, the tail being 20 twenty-six inches long ; it was the largest monkey I saw in America, with the exception of a black Howler, whose body was twenty-eight inches in height. From information given me I calculated that one horde of a tribe of Indians, two hundred in number, destroyed twelve hundred of these monkeys annually for food.

Marmosets ¹⁶ of the Upper River

The marmoset found at Pará does not occur on the Upper Amazons ; but in its stead a closely allied species,



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HUMBOLDT'S SPIDER-MONKEY.
(*Lagothrix Humboldti* or *Lagothrix lagothrix*.)
Bates's "Barrigudo" monkey.

the *Midas rufoniger*, presents itself. One day, whilst walking along a forest pathway, I saw one of these lively little fellows miss his grasp as he was passing from one

tree to another along with his troop. He fell head foremost from a height of at least fifty feet, but managed cleverly to alight on his legs in the pathway; quickly



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LION TAMARIN OR SILKY MARMOSET.

(*Midas leoninus* or *Midas rosalia*.)

turning round he gave me a good stare for a few moments, and then bounded off gaily to climb another tree.

I once saw on the Upper Amazons a tame individual of the *Midas leoninus*, a species first described by Humboldt, which was still more playful and intelligent than the *Midas ursulus*, already described. This rare and beautiful little monkey is only seven inches in length, exclusive of the tail. It is named *leoninus* on account of the long brown mane which depends from the neck, and which gives it very much the appearance of a diminutive lion. In the house where it was kept, it was familiar
10 with everyone ; its greatest pleasure being to climb about the bodies of different persons who entered. The first time I went in, it ran across the room straightway to the chair on which I had sat down, and climbed up to my shoulder ; arrived there, it turned round and looked into my face, shewing its little teeth, and chattering, as though it would say, " Well, and how do *you* do ? "

The last I shall mention is one of the most diminutive forms of the monkey order, three full-grown specimens of which, measuring only seven inches in length of body,
20 I obtained near S. Paolo. The pretty lilliputian face is furnished with long brown whiskers, which are naturally brushed back over the ears. I was surprised, on my return to England, to learn from specimens in the British Museum, that this pigmy marmoset was found also in Mexico, no other Amazonian monkey being known to wander far from the great river plain.²¹ Thus the smallest, and apparently the feeblest, species of the whole order, is one which has, by some means, become the most widely dispersed.

CHAPTER V

FAUNA OF THE FOREST (*Continued*)

OTHER MAMMALS

AT Pará we were disappointed in not meeting with any of the larger animals in the forest. No tapir or jaguar crossed our path. There is, in fact, a great variety of mammals, birds, and reptiles, but they are widely scattered, and all excessively shy of man. The region is so extensive, and uniform in the forest-clothing of its surface, that it is only at long intervals that animals are seen in abundance. Brazil, moreover, is throughout poor in terrestrial mammals, and the species are of small size; they do not, therefore, form a conspicuous feature 10 in its forests. The huntsman would be disappointed who expected to find here flocks of animals similar to the buffalo-herds of North America, or the swarms of antelopes of Southern Africa.

Puma

One day I was searching for insects in the bark of a fallen tree, when I saw a large cat-like animal advancing towards the spot. It came within a dozen yards without perceiving me. I had no weapon with me but an old chisel, and was getting ready to defend myself if

it should make a spring, when it turned round hastily and trotted off. I did not obtain a very distinct view of it, but I could see its colour was that of the Puma, or



Photographed from Life by Graham Renshaw

PUMA.

Bates's "American lion."

American lion, although it was rather too small for that species. The puma is not a common animal in the Amazons forests. The hunters are not at all afraid of

it, and speak always in disparaging terms of its courage. Of the jaguar they give a very different account.

Jaguar, Ocelot, Deer, Opossum

We never saw a mammal of any kind on the campos ;



Photo by R. H. Fletcher

From the Manchester Grammar School Museum.

OCELOT.

Bates's "Small tiger-cat."

but tracks of three species were seen occasionally, besides those of the jaguar ; these belonged to a small tiger-cat, a deer, and an opossum ; all of which animals must have been very rare, and probably nocturnal in their habits, with the exception of the deer. In the country behind Santarem, towards the interior, jaguars roam nightly, at least in the rainy season, close up to the ends of the 10 suburban streets.

Sloth

I once had an opportunity of watching the movements of a Sloth, which was clothed with shaggy grey hair. The natives call it the sloth of the mainland, to distinguish it from the sloth of the flooded lands. Some



Photographed from life by W P Dando

TWO-TOED SLOTH.

(*Cholæpus didactylus*.)

The one described by Bates is the Three-toed Sloth.

(*Bradypus tridactylus*.)

travellers in South America have described the sloth as very nimble in its native woods, and have disputed the justness of the name which has been bestowed upon it. The inhabitants of the Amazons region, however, hold to the common opinion, and consider the sloth as the type

of laziness. It is a strange sight to watch the uncouth creature, fit production of these silent shades, lazily moving from branch to branch. Every movement betrays, not indolence exactly, but extreme caution. He never looses his hold from one branch without first securing himself to the next, and when he does not immediately find a bough to grasp with the rigid hooks into which his paws are so curiously transformed, he raises his body, supported on his hind-legs, and claws around in search of a fresh foothold. In one of our 10 voyages, Mr. Wallace and I saw a sloth swimming across a river, at a place where it was probably three hundred yards broad. I believe it is not generally known that this animal takes to the water. Our men caught the beast, cooked, and ate him.

Ant-eater

The great Ant-eater was not uncommon in the drier forests of the Amazons valley, but is not found, I believe, in the flooded lands. It has an excessively long slender muzzle, and a wormlike extensile tongue. Its jaws are destitute of teeth. The claws are much elongated, and 20 its gait is very awkward. It lives on the ground, and feeds on white ants; the long claws being employed to pull in pieces the solid hillocks made by the insects, and the long flexible tongue to lick them up from the crevices. One day an old negro came to me in great distress, with the news that his favourite dog had been caught in the grip of an ant-eater, and killed. We hastened to the place, and found the dog was not dead, but severely torn by the claws of the ant-eater, which itself was mortally wounded, and was now relaxing its grasp. 30

All the other species of this singular genus are arboreal. I met with four species altogether ; two were very small kinds, ten inches in length, exclusive of the tail. One was brought to me alive at Caripí, having been caught by an Indian, clinging motionless inside a hollow tree. I



Photographed from life by W. P. Dando

GREAT ANT-EATER.

(*Myrmecophaga jubata*.)

kept it in the house about twenty-four hours. It remained nearly all the time without motion, except when irritated, in which case it reared itself on its hind legs from the back of a chair and clawed out with its
10 fore paws like a cat. Its manner of clinging with its claws, and the sluggishness of its motions, gave it a great resemblance to a sloth. It uttered no sound, and

remained all night on the spot where I had placed it in the morning. The next day I placed it on a tree in the open air, and at night it escaped. These small ant-eaters are nocturnal in their habits, and feed on those species of white ants which construct earthy nests, that



Photo by R. H. Fletcher

From the Manchester Grammar School Museum

KINKAJOU OR JUPURA.
(*Cercoleptes Caudivolvulus.*)

look like ugly excrescences on the trunks and branches of trees.

Kinkajou

A curious animal, known to naturalists as the Kinkajou, may be mentioned here. It has been considered by some authors as intermediate between the family of apes 10 and the bear family. It has decidedly no close relationship to either of the groups of American monkeys. Its

tail is very flexible towards the tip, and is used to twine round branches in climbing. I did not see or hear anything of this animal whilst residing on the Lower Amazons, but on the banks of the Upper River it appeared to be rather common. It is nocturnal in its habits, like the owl-faced monkeys, although, unlike them, it has a bright, dark eye. I once saw it in considerable numbers about twenty miles above Ega. Past midnight, when all became still, as I was listening to the dull fanning sound
10 made by the wings of impish hosts of vampire-bats crowding round the trees, a rustle commenced from the side of the woods, and a troop of slender, long-tailed animals were seen against the clear moonlit sky, taking flying leaps from branch to branch, through the grove. The hustling, twittering, and screaming, with sounds of falling fruits, shewed how they were employed. I kept a young one as a pet animal for several weeks, feeding it on bananas and mandioca-meal mixed with treacle. It became tame in a very short time.

Opossum

20 During our voyage up the Tapajos, a settler brought me a beautiful opossum, which had been caught in his fowl-house a little before sunrise. It was not so large as a rat, and had soft brown fur, with a black stripe on each cheek. This made the third species of marsupial rat I had so far obtained; but the number of these animals is very considerable in Brazil, where they take the place of the shrews of Europe²²; shrew-mice and, indeed, the whole of the insectivorous order of mammals, being entirely absent from tropical America. One kind
30 of these rat-like opossums is aquatic, and has webbed

feet. The terrestrial species are nocturnal in their habits, sleeping during the day in hollow trees, and coming forth at night to prey on birds in their roosting places. It is very difficult to rear poultry in this country on



Photo by R H Fletcher

From the Manchester Grammar School Museum

OPOSSUM.

account of these small opossums, scarcely a night passing, in some parts, in which the fowls are not attacked by them.

Sea-cow ²³

On our voyage to Ega the men on one occasion harpooned a sea-cow; the canoe was stopped for six or seven hours, and all turned out into the forest to help 10 to skin and cook the animal. The meat has somewhat the taste of very coarse pork. The animal was a large

one, measuring nearly ten feet in length, and nine in girth at the broadest part. The sea-cow is one of the few objects which excite the dull wonder and curiosity of the Indians, notwithstanding its commonness. The fact of its suckling its young at the breast, although an aquatic animal resembling a fish, seems to strike them as something very strange. The sea-cow is a great resource in the wet season. It is caught by harpooning, which requires much skill, or by strong nets made of
10 very thick hammock twine, and placed across narrow inlets.

Black Jaguar ²⁴

On one of our excursions round Ega we had a little adventure with a black tiger or jaguar. We were paddling rapidly past a long beach of dried mud, when the Indians became suddenly excited, shouting: "Behold the jaguar, the black jaguar!" Looking ahead we saw the animal quietly drinking at the water's edge. By the time we were landed the tiger had seen us, and was retracing his steps towards the forest. The black
20 tiger appears to be more abundant than the spotted jaguar in the neighbourhood of Ega. The most certain method of finding it is to hunt, assisted by a string of Indians shouting and driving the game before them, in the narrow strips of dry land in the forest which are isolated by the flooding of their neighbourhood in the wet season.

Dolphins

In the sea-like expanse of waters which forms the mouth of the Tocantins numbers of fresh-water dolphins

were rolling about in shoaly places. There were here two species, one of which was new to science when I sent specimens to England. In the Upper Amazons a third pale flesh-coloured species is also abundant.



Photographed from life by W P Dando

JAGUAR.

With the exception of one more species, found in the Ganges, all other varieties of dolphins inhabit exclusively the sea.

In the broader parts of the Amazons, from the mouth to a distance of fifteen hundred miles in the interior, one or other of the three kinds here mentioned are always 10 heard rolling, blowing, and snorting, especially at night,

and these noises contribute much to the impression of sea-wide vastness and desolation which haunts the traveller.

Rodents : Paca, Cutia and Capybara

Near Caripí we made a hunting excursion in search of pacas and cutias. The method adopted to secure



Photo by R. H. Fletcher.

From the Manchester Grammar School Museum.

AGOUTI.

(Similar to the Cutias and Pacas mentioned by Bates.)

them was this : at an early hour they would be seen feeding on the fallen fruits, but would quickly, on hearing a noise, betake themselves to their burrows ; my companion was then to turn them out by means of the dogs, and I remained in the boat, ready to shoot all that came to the edge of the stream—the habits of both animals, when hard pressed, being to take to the water. On the chain of lakes called Lagos de Cararaucú, between

Obydos and Manaos, we saw, amongst the rank herbage on the muddy banks, small herds of capybaras, a large rodent, like a colossal guinea-pig.



Photographed from life by W P Dando

GREAT WATER-CAVY.
Capybara, Capivara, or Carpincho.
(*Hydrochaerus capibara*.)
The largest Rodent known.

CHAPTER VI

FAUNA OF THE FOREST (*Continued*)

OTHER MAMMALS

Vampires and other Bats ²⁵

BATS exist in very considerable numbers and variety in the forest, as well as in the buildings of the villages. Many small and curious species, living in the woods, conceal themselves by day under the broad leaf-blades of plants which grow in shady places ; others cling to the trunks of trees.

The first few nights I spent at Caripí I was much troubled by bats. The room where I slept had not been used for some months, and the roof was open to the tiles
10 and rafters. I was aroused about midnight by the rushing noise made by vast hosts of bats sweeping about the room. The air was alive with them ; they had put out the lamp, and when I relighted it the place appeared blackened with the impish multitudes that were whirling round and round. After I had laid about with a stick for a few minutes they disappeared among the tiles, but when all was still again they returned, and once more extinguished the light. The next night several got into my hammock ; I seized them as they were crawling
20 over me ; the next morning I found a wound, evidently

caused by a bat, on my hip. By far the greater number belonged to a species having very large ears, and measuring two feet from tip to tip of the wings. According to the negroes, the only kind which attacks man is a small kind having a leaf-shaped fleshy expansion on the tip of the nose. I am inclined to think many different kinds



Photo by R. H. Fletcher

From the Manchester Grammar School Museum

COATIMUNDI.

Described by Bates as "one of a genus of Plantigrades allied to the bears, and entirely arboreal; with a long flexible tail like that of certain monkeys."

of bats have this propensity. The fact of their sucking the blood of persons sleeping, from wounds which they make in the toes, is now well established.

At Ega I captured altogether, without giving especial 10 attention to bats, sixteen different species. The little grey blood-sucking species mentioned above was not uncommon, but the vampire was here by far the most abundant of the family of leaf-nosed bats. It is the largest of all the South American species, measuring twenty-eight inches in expanse of wing. Nothing

in animal physiognomy can be more hideous than the countenance of this creature when viewed from the front; the large leathery ears standing out from the sides and top of the head; the erect spear-shaped appendage on the tip of the nose; the grin and the glistening black eye; all combining to make up a figure that reminds one of some mocking imp of fable. No wonder that imaginative people have inferred diabolical instincts on the part of so ugly an animal. The vampire, 10 however, is the most harmless of all bats, and its inoffensive character is well known to residents on the banks of the Amazons. I opened the stomachs of several of these bats, and found them to contain a mass of pulp and seeds of fruits, mingled with a few remains of insects.

CHAPTER VII

FAUNA OF THE FOREST (*Continued*)

BIRDS

General remarks on the Birds

THE first thing that would strike a new-comer in the forests of the Upper Amazons would be the general scarcity of birds ; indeed, it often happened that I did not meet with a single bird during a whole day's ramble in the richest and most varied parts of the woods. Yet the country is tenanted by many hundred species, many of which are, in reality, abundant, and some of them conspicuous from their brilliant plumage. The cause of their apparent rarity is to be sought in the sameness and density of the thousand miles of forest 10 which constitute their dwelling-place. The birds of the country are gregarious, at least during the season when they are most readily found ; but the frugivorous kinds are to be met with only when certain wild fruits are ripe, and to know the exact localities of the trees requires months of experience. It would not be supposed that the insectivorous birds are also gregarious ; but they are so ; numbers of distinct species, belonging to many different families, joining together in the chase or search for food.

Whilst hunting along the narrow pathways that are made through the forest in the neighbourhood of houses and villages, one may pass several days without seeing many birds ; but now and then the surrounding bushes and trees appear suddenly to swarm with them. There are scores, probably hundreds, of birds, all moving about with the greatest activity—woodpeckers running up the tree-trunks ; tanagers, ant-thrushes, humming-birds, fly-catchers, and barbets²⁶ flitting about the leaves
10 and lower branches. The bustling crowd loses no time, and although moving in concert, each bird is occupied, on its own account, in searching bark, or leaf, or twig. the barbets visiting every clayey nest of white ants on the trees which lie in the line of march. In a few minutes the host is gone, and the forest path remains deserted and silent as before. There appeared to be only one of these flocks in each district ; the simplest explanation appears to be this : that the birds associate
in flocks from the instinct of self-preservation, and in
20 order to be a less easy prey to hawks, snakes, and other enemies, than they would be when feeding alone.

Humming-birds

In January the orange-trees round Caripí become covered with blossom—at least to a greater extent than usual, for they flower more or less in this country all the year round—and the flowers attract a great number of humming-birds. Every day, in the cooler hours of the morning, and in the evening from four o'clock till six, they were to be seen whirring about the trees by scores. Their motions are unlike those of any
30 other birds. They dart to and fro so swiftly that the

eye can scarcely follow them, and when they stop before a flower it is only for a few moments. They poise themselves in an unsteady manner, their wings moving with inconceivable rapidity: probe the flower, and then shoot off to another part of the tree. They do not



Taken by permission from the Avicultural Magazine

WHITE-NECKED AMAZON RAIL.

(*Porzana Albicollis*.)

proceed in that methodical manner which bees follow, taking the flowers seriatim, but skip about from one part of the tree to another in the most capricious way.

Sometimes two males close with each other and fight, mounting upwards in the struggle, as insects are often 10 seen to do when similarly engaged, and then separating hastily and darting back to their work. Now and then

they stop to rest, perching on leafless twigs, where they may sometimes be seen probing, from the places where they sit, the flowers within their reach. The brilliant colours with which they are adorned cannot be seen whilst they are fluttering about.

There is not a great variety of humming-birds in the Amazons region, the numbers of species being far smaller in these uniform forest plains than in the diversified valleys of the Andes, under the same parallels of latitude. The family is divisible into two groups, contrasted in form and habits, one containing species which live entirely in the shade of the forest, and the other comprising those which prefer open sunny places. The forest species are seldom seen at flowers, flowers being, in the shady places where they abide, of rare occurrence ; but they search for insects on leaves, threading the bushes and passing above and beneath each leaf with wonderful rapidity. The other group are not quite confined to clear places, as they come into the forest
10 whenever a tree is in blossom, and descend into sunny openings where flowers are to be found.

I searched well at Caripí, expecting to find the most beautiful of all humming-birds, having round the neck a frill of long white feathers tipped with golden green. I was not, however, so fortunate as to meet it. Several times I shot by mistake a humming-bird hawk-moth instead of a bird. This moth is somewhat smaller than
humming-birds generally are ; but its manner of flight, and the way it poises itself before a flower whilst probing
30 it with its proboscis, are precisely like the actions of humming-birds. It was only after many days' experience that I learnt to distinguish one from the other when on

the wing. The analogy between the two creatures has been brought about, probably, by the similarity of their habits, there being no indication of the one being adapted in outward appearance with reference to the other.

It has been observed that humming-birds are unlike other birds in their mental qualities, resembling in this respect insects rather than warm-blooded vertebrate animals. The want of expression in their eyes, the small degree of versatility in their actions, the quickness and precision of their movements, are all so many points of resemblance between them and insects. They build their nests, which are made of fine vegetable fibres and lichens, densely woven together and thickly lined with silk-cotton from the fruit of the samaüma tree, on the inner side of the tips of palm-fronds. They are long and purse-shaped. The young, when first hatched, have very much shorter bills than their parents.

In the orange-groves near Cametá humming-birds were plentiful, but I did not notice more than three species. I saw one day a little pigmy belonging to the genus *Phaethornis* in the act of washing itself in a brook, perched on a thin branch, one end of which was under water. It dipped itself, then fluttered its wings and pruned its feathers, and seemed thoroughly to enjoy itself alone in the shady nook which it had chosen—a 30 place overshadowed by broad leaves of ferns and *Heliconiae*. I thought, as I watched it, that there was no



Photo by R. H. Fletcher

HUMMING BIRD'S
NEST.

need for poets to invent elves and gnomes whilst nature furnishes us with such marvellous little sprites ready to hand.



Photographed from life by W. P. Dando

MAGUARI STORK.
(*Dissura maguari*.)

Waders : Heron, Stork, Egret ²⁷

While sailing from Obydos to Manaos, we stayed four days at Villa Nova. As soon as we anchored, I set off to explore the district, entering the forest by a dry watercourse. About a furlong inland this opened on a broad placid pool whose banks, clothed with grass of the softest green hue, sloped gently from the water's edge



Photo by William Beebe.

By kind permission of the New York Zoological Society.

VICTORIA REGIA, THE GIANT WATER-LILY OF THE AMAZON
TRIBUTARIES.

The leaves are sometimes twelve feet across.

to the compact wall of forest which encompassed the whole. The pool swarmed with water-fowl; snowy egrets, dark-coloured striped herons, and storks of various species standing in rows around its margins. Small 10 flocks of macaws were stirring about the topmost branches of the trees. Long-legged piosócas ²⁸ stalked over the water-plants on the surface of the pool, and in

the bushes on the margin were numbers of a kind of canary of a greenish-yellow colour, which has a short and not very melodious song. We had advanced but a few steps when we startled a pair of very powerful birds of the stork family, four and a half feet in height, which flew up and alarmed the rest. Passing towards the farther end of the pool, I saw resting on the surface of the water, a number of large round leaves, turned up at their edges ; they belonged to the Victoria water-lily.

10 The leaves were just beginning to expand, and the largest measured not quite three feet in diameter.

Hawks and Eagles

We saw many kinds of hawks and eagles, one of which, a black species, sat on the top of a tall naked stump, uttering its hypocritical whining notes. This eagle is considered a bird of ill omen by the Indians ; it often perches on the tops of trees in the neighbourhood of their huts, and is then said to bring a warning of death to some member of the household. The little courageous fly-catcher assembles in companies of four or five, and
20 attacks it boldly, driving it from the perch where it would otherwise sit for hours.²⁹

Vultures

I was much annoyed, and at the same time amused, with the vultures. The Portuguese call them crows ; in colour and general appearance they somewhat resemble rooks, but they are much larger, and have naked, black, wrinkled skin about their face and throat. They assemble in great numbers in the villages about the end of the wet season, and are then ravenous with hunger. My cook

could not leave the open kitchen at the back of the house for a moment, whilst the dinner was cooking, on account of their thievish propensities. Some of them were always loitering about, watching their opportunity,



Photo by R. H. Fletcher

From the Manchester Grammar School Museum

SOUTH-AMERICAN TREE-CREEPER.

and the instant the kitchen was left unguarded, the bold marauders marched in and lifted the lids of the saucepans with their beaks to rob them of their contents. The boys of the village lie in wait, and shoot them with bow and arrow. As the dry season advances, they follow the fishermen to the lakes, where they gorge themselves 10 with the offal of the fisheries.

Creepers, Thrushes, etc.

Birds and insects were rare amidst the charming sylvan scenes round Barra, at the mouth of the Rio Negro. I have often traversed the whole distance from Barra to the waterfall, about two miles by the forest-road, without seeing or hearing a bird. In the thinner woods near the borders of the forest many pretty little blue and green creepers were daily seen feeding on berries ; and a few very handsome birds occurred in the forest. I obtained, amongst others, specimens of the
10 Peacock Trogon, a most beautiful creature, having soft golden-green plumage, red breast, and an orange-coloured beak ; also the Ampelis, a rich glossy-purple chatterer with wings of a snowy-white hue.

My best hunting-ground near Santarem was a part of the valley of the Irura sheltered on one side by a steep hill whose declivity, like the swampy valley beneath, was clothed with magnificent forest. Here might be heard the pleasing wild notes of the Carashué, a species
• of thrush. It is a much smaller and plainer bird than
20 our thrush, and its song is not so loud or varied, or so long sustained ; but the tone is of a sweet and plaintive quality, which harmonises well with the wild and silent woodlands, where alone it is heard in the mornings and evenings of sultry tropical days. In course of time the song of this humble thrush stirred up pleasing associations in my mind, in the same way that those of its more highly endowed sisters did at home. The Brazilians are not insensible to the charms of this their best songster, for I often heard some pretty verses in praise of it sung by
30 young people to the accompaniment of the guitar. I

found, several times, the nest of the Carashué, which is built of dried grass and slender twigs, and lined with



Photo by P G Howes

By kind permission of the New York Zoological Society

NEST OF BLUE HONEY-CREEPER.

(*Cyanerpes cyaneus cyaneus* Linn.)

mud: the eggs are coloured and spotted like those of our blackbird, but they are considerably smaller.

In returning from our trips we were sometimes

benighted on the campos. We did not care for this on moonlit nights, when there was no danger of losing the path. The great heat felt in the middle of the day is mitigated by four o'clock in the afternoon ; a few birds then make their appearance ; small flocks of ground-doves run about the stony hillocks ; parrots pass over and sometimes settle ; pretty little finches of several species, especially one kind, streaked with olive-green and yellow, and somewhat resembling our yellow-hammer, but I believe not belonging to the same genus, hop about the grass, enlivening the place with a few musical notes. The Carashué also then resumes its mellow, blackbird-like song ; and two or three species of humming-birds flit about from tree to tree.

Goatsuckers ³⁰

As soon as it is night, swarms of goatsuckers suddenly make their appearance, wheeling about in a noiseless, ghostly manner, in chase of night-flying insects. They sometimes descend and settle on a low branch, or even on the pathway close to where one is walking, and then squatting down on their heels, are difficult to distinguish from the surrounding soil. One kind has a long forked tail. They make no nest, but lay their eggs on the bare ground.³¹ Their breeding time is in the rainy season, and fresh eggs are found from December to June. Later in the evening, the singular notes of the goatsuckers are heard, one species calling Quao Quao, another Chuch-co-co-cao ; and these are repeated far into the night in the most monotonous manner

Maracana Parrot

Once, as we were crossing the river Tapajos, a pretty little parrot fell from a great height headlong into the



Photographed from life by W P Dando

AMAZON PARROT.

(*Chrysotis festiva*.)

water near the boat, having dropped from a flock which seemed to be fighting in the air. One of the Indians

secured it for me, and I was surprised to find the bird uninjured. There had probably been a quarrel about mates, resulting in our little stranger being temporarily stunned by a blow on the head from the beak of a jealous comrade. The species was called by the natives Maracana; the plumage was green, with a patch of scarlet under the wings. I wished to keep the bird and tame it, but all our efforts to reconcile it to captivity were vain; it refused food, bit every one who went near
10 it, and damaged its plumage in its exertions to free itself. After trying nearly a week I was recommended to lend the intractable creature to an old Indian woman, living in the village, who was said to be a skilful bird-tamer. In two days she brought it back almost as tame as the familiar love-birds of our aviaries. I kept my little pet for upwards of two years; it learned to talk pretty well and was considered quite a wonder as being a bird usually so difficult of domestication. I do not know what arts the woman used. The chief reason why
20 almost all animals become so wonderfully tame in the houses of the natives is, I believe, their being treated with uniform gentleness, and allowed to run at large about the rooms.

Our Maracana used to accompany us sometimes in our rambles, one of the lads carrying it on his head. One day, in the middle of a long forest road, it was missed, having clung probably to an overhanging bough and escaped into the thicket without the boy perceiving it. Three hours afterwards, on our return by the same
30 path, a voice greeted us in a colloquial tone as we passed: "Maracana!" We looked about for some time, but could not see anything, until the word was repeated

with emphasis: "*Maracana!*" Then we espied the little truant half concealed in the foliage of a tree. He came down and delivered himself up, evidently as much rejoiced at the meeting as we were.

While exploring the low and swampy tract along the coast to the north of Santa Cruz,* we surprised a large flock, composed of about fifty individuals, of a curious



Photo by P. G. Howes.

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YOUNG PARROTS.

eagle with a very long and slender hooked beak. They were perched on the bushes that surrounded a shallow lagoon, separated from the river by a belt of floating 10 grass; my men said they fed on toads and lizards found at the margins of pools. They formed a beautiful sight as they flew up and wheeled about at a great height in the air.

Turkeys

While staying at the house of a settler on the Cuparí, a branch of the Tapajos, we were amused at the excessive and almost absurd tameness of a turkey, that ran about the house. It was a large glossy-black species, having

* This is Santa Cruz on the Tapajos.

an orange-coloured beak, surmounted by a bean-shaped excrescence of the same hue. It seemed to consider itself as one of the family ; attended at all meals, passing from one person to another round the mat to be fed, and rubbing the sides of its head in a coaxing way against their cheeks or shoulders. At night it went to roost on a chest in a sleeping-room beside the hammock of one of the little girls, to whom it seemed particularly attached, following her wherever she went about the
10 grounds.

I found this kind of bird was very common in the forest of the Cuparí ; but it is rare on the Upper Amazons, where an allied species, which has a round instead of a bean-shaped waxen excrescence on the beak, is the prevailing kind. These birds in their natural state never descend from the tops of the loftiest trees, where they live in small flocks and build their nests. The bird lays two rough-shelled white eggs ; it is fully as large as the common turkey, but the flesh when cooked is
20 drier and not so well flavoured. It is difficult to find the reason why these superb birds have not been reduced to domestication by the Indians, seeing that they so readily become tame ; the common turkey, which has been introduced into the country, is much prized.

Blue Macaw

I obtained, on this same river, six good specimens of the hyacinthine macaw, besides a number of smaller birds. The macaws were found feeding in small flocks on the fruit of a palm, the excessively hard nut of which is crushed into pulp by the powerful beak of the bird.
30 I found the craws of all the specimens filled with the

sour pulp to which the stone-like fruit had been reduced.

Gulls and smaller birds

During the four years and a half that I remained on



Taken by permission from the Avicultural Magazine

WHITE-NECKED AMAZON RAIL.

(*Porzana Albicollis*.)

the Upper Amazons I made Ega my headquarters ; my excursions into the neighbouring region, however, extended sometimes as far as three or four hundred miles from this place. The year at Ega is divided according to the rises and falls of the river, with which coincide the wet and dry periods. Towards the middle of July the sand-banks begin to reappear above the surface of 10

the waters, and with this change come flocks of sand-pipers and gulls, which latter make known the advent of the fine season, as the cuckoo does of the European spring; uttering almost incessantly their plaintive cries as they fly about over the shallow waters of sandy shores. Most of the gaily-plumaged birds have now finished moulting, and begin to be more active in the forest. The whole of the country for hundreds of miles is covered with picturesque but pathless forests; the
10 place was the resort of kingfishers, green and blue tree-creepers, purple-headed tanagers, and humming-birds. Birds generally, however, were not numerous.

Umbrella-bird

It was on the occasion of our excursion to Catua, some distance below Ega, that I had the great pleasure of seeing, for the first time, the rare and curious Umbrella-bird, a species which resembles in size, colour, and appearance, our common crow, but is decorated with a crest of long, curved, hairy feathers, having long bare quills, which, when raised, spread themselves out in
20 the form of a fringed sunshade over the head. A strange ornament, like a pelerine, is also suspended from the neck, formed by a thick pad of glossy steel-blue feathers, which grow on a long fleshy lobe or excrescence. This lobe is connected with an unusual development of the trachea and vocal organs, to which the bird doubtless owes its singular, deep, loud, and long-sustained fluty note. The Indian name of this strange creature is fife-bird, in allusion to the tone of its voice. We had the good
30 luck, after remaining quiet a short time, to hear its performance. It drew itself up on its perch, spread

widely the umbrella-formed crest, dilated and waved its glossy breast-lappet, and then, in giving vent to its



UMBRELLA-BIRD.
(*Cephalopterus ornatus*.)

loud piping note, bowed its head slowly forwards. The female has only the rudiments of the crest and lappet,

and is duller-coloured altogether than the male. The range of this bird appears to be confined to the plains of the Upper Amazons; it has not been found to the east of the Rio Negro.

Toucans

Of the Toucans, so conspicuous from the great size and light structure of their beaks, and so characteristic of tropical American forests, five species inhabit the woods of Ega. They are found more or less numerous throughout the year, as they breed in the neighbourhood, 10 laying their eggs in holes of trees, at a great height from the ground. During most months of the year they are met with singly or in small flocks, and the birds are then very wary. Sometimes one of these little bands of four or five is seen perched, for hours together, amongst the topmost branches of high trees, giving vent to their remarkably loud, shrill, yelping cries.⁷ one bird, mounted higher than the rest, acting, apparently, as leader of the inharmonious chorus: but two of them are often heard yelping alternately, and in different notes. These cries 20 have a vague resemblance to the syllables Tocáno, Tocáno, and hence the Indian name of this genus of birds. At these times they desery the hunter before he gets near to the tree on which they are perched, although he may be half-concealed amongst the underwood, 150 feet below them. They stretch their necks downwards to look beneath, and on espying the least movement among the foliage, fly off to the more inaccessible parts of the forest.

Solitary Toucans are sometimes met with at the 30 same season, hopping silently up and down the larger



Photo by P. G. Howell.

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NEST OF RED-BILLED TOUCAN.

(*Rhamphastos monilis*.)

Opened with axe to show egg—showing also the Bird's entrance above.

boughs, and peering into crevices of the tree-trunks. They moult in the months from March to June. This season of enforced quiet being passed, they make their appearance suddenly in the dry forest, near Ega, in large flocks, probably assemblages of birds gathered together from the neighbouring forests, which are then flooded and cold. The birds have now become extraordinarily tame, and the troops travel with heavy laborious flight from bough to bough amongst the lower
10 trees. They thus become an easy prey to hunters, and everyone at Ega, who can get a gun of any sort, or a blow-pipe, goes daily to the woods to kill a few brace for dinner ; for the people of Ega live almost exclusively on stewed and roasted Toucan during the months of June and July ; the birds being then very fat, and the meat exceedingly sweet and tender.

The Bill of the Toucan

No one, on seeing a Toucan, can help asking what is the use of the enormous bill, which, in some species, attains a length of seven inches, and a width of more
20 than two inches. Toucans are now well-known to be eminently arboreal birds, and to belong to a group (including trogons, parrots, and barbets), all of whose members are fruit-eaters. On the Amazons, where these birds are very common, no one pretends ever to have seen a Toucan walking on the ground in its natural state, much less acting the part of a swimming or wading bird. Professor Owen found, on dissection, that the gizzard in Toucans is not so well adapted for the trituration of food as it is in other vegetable feeders, and
30 concluded therefore, as Broderip had observed the habit

of chewing the cud in a tame bird, that the great toothed bill was useful in holding and remasticating the food.

Flowers and fruit on the crowns of the large trees of South American forests grow, principally, towards the end of slender twigs, which will not bear any considerable weight ; all animals, therefore, which feed upon fruits,



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RED-BILLED TOUCAN.
(*Rhamphastos monilis*. Muller.)

or on insects contained in flowers, must, of course, have some means of reaching the ends of the stalks from a distance. Monkeys obtain their food by stretching forth their long arms and, in some instances, their tails, 10 to bring the fruit near to their mouths. Humming-birds are endowed with highly-perfected organs of flight, with corresponding muscular development, by which they are enabled to sustain themselves on the wing before blossoms whilst rifling them of their contents.

These strong-flying creatures, however, will, when they can get near enough, remain on their perches whilst probing neighbouring flowers for insects. Trogons have feeble wings, and a dull, inactive temperament. Their mode of obtaining food is to station themselves quietly on low branches in the gloomy shades of the forest, and eye the fruits on the surrounding trees, darting off, as



Photo by R. H. Fletcher

From the Manchester Grammar School Museum.

TOUCAN.

if with an effort, every time they wish to seize a mouthful, and returning to the same perch. Barbets seem to have
10 no special endowment, either of habits or structure, to enable them to seize fruits ; and in this respect they are similar to the Toucans, if we leave the bill out of question. both tribes having heavy bodies, with feeble organs of flight, so that they are disabled from taking their food on the wing. The purpose of the enormous bill here becomes evident. It is to enable the Toucan to reach

and devour fruit whilst remaining seated, and thus to counterbalance the disadvantage which its heavy body and gluttonous appetite would otherwise give it in the competition with allied groups of birds. The relation between the extraordinarily lengthened bill of the Toucan and its mode of obtaining food, is therefore precisely similar to that between the long neck and lips of the giraffe and the mode of browsing of the animal.

A pet Toucan

One day, whilst walking along the principal pathway in the woods near Ega, I saw one of these Toucans 10 seated on a low branch close to the road, and had no difficulty in seizing it with my hand. The bird was in a half-starved and sickly condition, but after a few days of good living it recovered health and spirits, and became one of the most amusing pets imaginable. I allowed Tocano to go free about the house, contrary to my usual practice with pet animals ; he never, however, mounted my working-table after a smart correction which he received the first time he did it. He used to sleep on the top of a box in a corner of the room, in the usual 20 position of these birds, namely, with the long tail laid right over on the back, and the beak thrust under the wing. He ate of everything that we ate : beef, turtle, fish, farinha, fruit ; and was a constant attendant at our table—a cloth spread on a mat. His appetite was most ravenous, and his power of digestion quite wonderful. He got to know the meal hours to a nicety, and we found it very difficult, after the first week or two, to keep him away from the dining-room, where he had become very impudent and troublesome, making his appearance 30

with the greatest punctuality as the meal was placed on the table. He acquired the habit, afterwards, of rambling about the street near our house, and one day he was stolen, so we gave him up for lost. But two days afterwards he stepped through the open doorway at dinner-hour, with his old gait, and sly magpie-like



Photo by P. G. Howes

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YOUNG TOUCAN: TEN DAYS OLD.

(Pteroglossus aracari.)

expression, having escaped from the house where he had been guarded by the person who had stolen him, which was situated at the further end of the village.

Mobbed by Toucans

- 10 I had an amusing adventure one day with these birds. I had shot one from a rather high tree in a dark glen in the forest, and entered the thicket where the bird had

fallen to secure my booty. It was only wounded, and on my attempting to seize it, set up a loud scream. In an instant, as if by magic, the shady nook seemed alive with these birds, although there were certainly none visible when I entered the jungle. They descended towards me, hopping from bough to bough, some of them swinging on the loops and cables of woody lianas, and all croaking and fluttering their wings like so many furies. The screaming of their companion having ceased, they remounted the trees, and disappeared.

10

Organ-bird

While staying at S. Paolo I frequently heard the organ-bird, the most remarkable songster, by far, of the Amazonian forests. When its singular notes strike the ear for the first time, the impression cannot be resisted that they are produced by a human voice. Some musical boy must be gathering fruit in the thickets, and is singing a few notes to cheer himself. The tones become more fluty and plaintive; they are now those of a flageolet, and notwithstanding the utter impossibility of the thing, one is for the moment convinced that some- 20 body is playing that instrument. No bird is to be seen, however closely the surrounding trees and bushes may be scanned, and yet the voice seems to come from the thicket close to one's ears. The ending of the song is rather disappointing. It begins with a few very slow and mellow notes, following each other like the commencement of an air; one listens expecting to hear a complete strain, but an abrupt pause occurs, and then the song breaks down, finishing with a number of clicking unmusical sounds like a piping barrel-organ out of wind 30

and tune.³² I never heard the bird on the Lower Amazon, and very rarely heard it even at Ega ; it is the only songster which makes an impression on the natives, who sometimes rest their paddles whilst travelling in



Photo by P G Howes

By kind permission of the New York Zoological Society

NEST AND EGG OF ORANGE-HEADED MANAKIN.

(*Pipra aureola aureola*, Linn.)

One of the "Chatterers."

their small canoes, along the shady by-streams, as if struck by the mysterious sounds.

The Blow-pipe of the Indians

Once while I was at Ega, I went a long ramble into the forest, taking with me a smiling well-behaved lad of about fourteen years of age, who was armed with his 10 blow-gun. This instrument is used by all the Indian tribes on the Upper Amazons. It is generally nine or

ten feet long, and is made of two separate lengths of wood, each scooped out so as to form one half of the tube. To do this with the necessary accuracy requires an enormous amount of patient labour, and considerable mechanical ability, the tools used being simply the incisor teeth of an animal. The two half-tubes,³³ when finished, are secured together by a very close and tight spirally-wound strapping, consisting of long flat strips of the wood of the climbing palm-tree, and the whole is smeared afterwards with black wax, the production of 10 a *Melipona* bee. The pipe tapers towards the muzzle, and a cup-shaped mouth-piece, made of wood, is fitted in the broad end. A full-sized gun is heavy, and can only be used by an adult Indian who has had great practice. The young lads learn to shoot with smaller and lighter tubes. When Mr. Wallace and I had lessons at Barra in the use of the blow-gun, we found it very difficult to hold steadily the long tubes.

The arrows are made from the hard rind of the leaf-stalks of certain palms, thin strips being cut and rendered 20 as sharp as needles by scraping the ends with a knife or the tooth of an animal. They are winged with a little oval mass of silk from the seed-vessels of the silk-cotton-tree, cotton being too heavy. The ball of silk should fit to a nicety the bore of the blow-gun; when it does so, the arrow can be propelled with such force by the breath that it makes a noise almost as loud as a pop-gun on flying from the muzzle. My companion was armed with a quiver full of these little missiles, a small number of which, sufficient for the day's sport, were 30 tipped with the fatal *Urari* poison.³⁴ The quiver was an ornamental affair.



Photo by P. G. Howes

By kind permission of the New York Zoological Society

NEST AND EGGS OF WHITE-NECKED CRIKE
(*Porzana albicollis*, Vieill.)

My little companion brought down a bird from a height which I calculated at thirty yards. The blow-gun, however, in the hands of an expert adult Indian, can be made to propel arrows so as to kill at a distance of fifty and sixty yards. The aim is most certain when the tube is held vertically, or nearly so. It is a far more useful weapon in the forest than a gun, for the report of a fire-arm alarms the whole flock of birds or monkeys feeding on a tree, whilst the silent poisoned dart brings the animals down one by one. None but the stealthy 10 Indian can use it effectively.

CHAPTER. VIII

FAUNA OF THE FOREST (*Continued*)

REPTILES

Alligators

THERE were, of course, many drawbacks to the amenities of a place like Ega as a residence for a European ; alligators, for example, were rather troublesome in the dry season. During these months there were almost always one or two lying in wait near the bathing-place for anything that might turn up at the edge of the water ; dog, sheep, pig, child, or drunken Indian. When this visitor was about, everyone took extra care whilst bathing. I used to imitate the natives in not advancing far from
10 the bank, and in keeping my eye fixed on that of the monster, which stares with a disgusting leer along the surface of the water ; the body being submerged to the level of the eyes, and the top of the head, with part of the dorsal crest, the only portions visible. When a little motion was perceived in the water behind the reptile's tail, bathers were obliged to beat a quick retreat. I was never threatened myself, but I often saw the crowds of women and children scared, whilst bathing, by the beast making a movement towards them : a general

scamper to the shore and peals of laughter were always the result in these cases.

The men can always destroy these alligators when they like to take the trouble to set out with boats and harpoons for the purpose ; but they never do it unless one of the monsters, bolder than usual, puts some one's life in danger. This arouses them, and they then track the enemy with the greatest pertinacity ; when half killed they drag it ashore and dispatch it amid loud execrations. Another, however, is sure to appear some 10 days or weeks afterwards, and take the vacant place on the station.

Once when we were netting turtles near Ega, and the net had been formed into a circle, and the men had jumped in, an alligator was found to be enclosed. No one was alarmed, the only fear expressed being that the imprisoned beast would tear the net. First one shouted : " I have touched his head " ; then another : " he has scratched my leg " ; one of the men, a lanky fellow, was thrown off his balance, and then there was no end 20 to the laughter and shouting. At last a youth of about fourteen years of age, on my calling to him, from the bank, to do so, seized the reptile by the tail, and held him tightly until, a little resistance having been overcome, he was able to bring it ashore. The net was opened, and the boy slowly dragged the dangerous but cowardly beast to land through the muddy water, a distance of about a hundred yards. Meantime, I had cut a strong pole from a tree, and as soon as the alligator was drawn to solid ground, gave him a smart rap with it 30 on the crown of his head, which killed him instantly. It was a good-sized individual ; the jaws being consider-

ably more than a foot long, and fully capable of snapping a man's leg in twain. The species was the large cayman

Alligators exist by myriads in the waters of the Upper



Photographed from life by Graham Renshaw.

ALLIGATORS BASKING.

Amazons. Many different species are spoken of by the natives. I saw only three, and of these two only are common: one a small kind, five feet long when full grown; the other the large cayman, which grows to a

length of eighteen or twenty feet, and attains an enormous bulk.

Like the turtles, the alligator has its annual migrations, for it retreats to the interior pools and flooded forests in the wet season, and descends to the main river in the dry season. During the months of high water, therefore, scarcely a single individual is to be seen in the main river. In the middle part of the Lower Amazons, where many of the lakes and their channels of communication with the trunk stream dry up in the fine months, the alligator buries itself in the mud and becomes dormant, sleeping till the rainy season returns. On the Upper Amazons, where the dry season is never excessive, it has not this habit, but is lively all the year round. It is scarcely exaggerating to say that the waters of the Solimoens are as well stocked with large alligators in the dry season, as a ditch in England is in summer with tadpoles. During a journey of five days which I once made in the Upper Amazons steamer, in November, alligators were seen along the coast almost every step of the way; they were very numerous in the still bays, where the huddled crowds jostled together, to the great rattling of their coats of mail, as the steamer passed.

The natives at once despise and fear the great cayman. I once spent a month at a small village of semi-civilised Indians, about twenty miles to the west of Ega. My entertainer one day proposed a half-day's fishing with net in the lake—the expanded bed of the small river on which the village is situated. We set out in an open boat with six Indians and two children. The water had sunk so low that the net had to be taken out into the middle by the Indians, whence at the first draught, two

medium-sized alligators were brought to land. They were disengaged from the net, and allowed, with the coolest unconcern, to return to the water, although the two children were playing in it, not many yards off. We continued fishing, and each time drew a number of the reptiles of different ages and sizes; the lake, in fact, swarmed with alligators.

After taking a very large
10 quantity of fish, we prepared to return, and the Indians, at my suggestion, secured one of the alligators, with the view of letting it loose among the swarms of dogs in the village. An individual was selected about eight feet long; one man holding his head and another his tail,
20 whilst a third took a few lengths of flexible liana, and deliberately bound the jaws



Photo by R. H. Fletcher From the Manchester Grammar School Museum

YOUNG ALLIGATOR:
Mounted in a comic attitude
for sale by the natives.

and the legs. Thus secured, the beast was laid across the benches of the boat, on which we sat during the hour and a half's journey to the settlement. We were rather crowded, but our amiable passenger gave us no trouble during the transit. On reaching the village, we took the animal into the middle of the green, opposite the church, where the dogs were congregated, and there
30 gave him his liberty, two of us arming ourselves with long poles to intercept him if he should make for the water, and the others exciting the dogs. The alligator shewed

great terror, although the dogs could not be made to advance, and made off at the top of its speed for the water, waddling like a duck. We tried to keep him back with the poles, but he became enraged, and seizing the end of the one I held in his jaws, nearly wrenched it from my grasp.

These little incidents shew the timidity or cowardice of the alligator. He never attacks man when his intended victim is on his guard; but he is cunning enough to know when this may be done with impunity; of this 10 we had proof a few days afterwards. The river had sunk to a very low point, so that the port and bathing-place of the village now lay at the foot of a long sloping bank, and a large cayman made his appearance in the shallow and muddy water. We were all obliged to be very careful in taking our bath; most of the people simply using a calabash, pouring the water over themselves while standing on the brink. A large trading canoe, belonging to a Barra merchant, arrived at this time, and the Indian crew, as usual, spent the first day 20 or two after their coming into port in drunkenness and debauchery ashore. One of the men, during the greatest heat of the day, when almost everyone was enjoying his afternoon's nap, took it into his head whilst in a tipsy state to go down alone to bathe. He was seen only by a feeble old man who was lying in his hammock, in the open verandah at the rear of his house, on the top of the bank, and who shouted to the besotted Indian to beware of the alligator. Before he could repeat his warning, the man stumbled, and a pair of gaping jaws, 30 appearing suddenly above the surface, seized him round the waist and drew him under the water. A cry of

agony ; “ Ai Jesús ! ”, was the last sign made by the wretched victim.

The village was aroused : the young men with praiseworthy readiness seized their harpoons and hurried down the bank ; but of course it was too late, a winding track of blood on the surface of the water was all that could be seen. They embarked, however, in boats, determined on vengeance : the monster was traced, and when, after a short lapse of time, he came up to breathe—
10 one leg of the man sticking out from his jaws—was dispatched with bitter curses.

While we were at Catua we were all, more or less, troubled by alligators. Some half dozen full-grown ones were in attendance, and floating about on the lazily-flowing, muddy water. No one could descend to bathe without being advanced upon by one of these hungry monsters. There was much offal thrown into the river, and this, of course, attracted them to the place. One day I amused myself by taking a basket of fragments
20 of meat, and drawing the alligators towards me by feeding them. They behaved pretty much as dogs do when fed ; catching the bones I threw them in their huge jaws, and coming nearer and shewing increased eagerness after each morsel. The enormous gape of their mouths, with their blood-red lining and long fringe of teeth, and the uncouth shapes of their bodies, made a picture of unsurpassable ugliness.

Every day these visitors became bolder ; at length they reached a pitch of impudence that was quite
30 intolerable. We slept in hammocks slung between posts ; a large wood fire (fed with a kind of wood abundant on the banks of the river, which keeps alight all night) being

made in the middle. One night I was awakened by a great uproar. It was caused by my host hurling burning firewood with loud curses at a huge cayman which had crawled up the bank and passed beneath my hammock, which was nearest the water. The reptile backed out



Photographed from life by W P Dando

BRAZILIAN TAPIR.
(*Tapirus Americanus*.)

and tumbled down the bank to the water, the sparks from the brands hurled at him flying from his bony hide. To our great surprise the animal (we supposed it to be the same individual) repeated his visit the very next night.

10

On one of our hunting excursions from this camp we saw several skeletons of the large cayman (some with the horny and bony hide of the animal nearly perfect) embedded in the sand ; they reminded me of the remains

of Ichthyosauri fossilised in beds of lias. I marked the place of one which had a well-preserved skull, and the next day returned to secure it. The specimen is now in the British Museum.

On another excursion we came upon a dry water-course, where we observed, first, the old foot-marks of a tapir, and, soon after, on the margin of a curious circular hole full of muddy water, the fresh tracks of a jaguar. The latter discovery was hardly made, when a
10 rush was heard amidst the bushes on the top of a sloping bank on the opposite side of the dried creek. We bounded forward; it was, however, too late, for the animal had sped in a few minutes far out of our reach. It was clear we had disturbed, on our approach, the jaguar, while quenching his thirst at the water-hole. A few steps further on we saw the mangled remains of an alligator. The head, forequarters and bony shell were the only parts which remained; but the meat was quite fresh, and there were many footmarks of the jaguar
20 round the carcase; so that there was no doubt this had formed the solid part of the animal's breakfast.

Alligator's nest and eggs

My companions now began to search for the alligator's nest, the presence of the reptile so far from the river being explainable on no other ground than its maternal solicitude for its eggs. We found the nest, in fact, at the distance of a few yards from the place. It was a conical pile of dead leaves, in the middle of which twenty eggs were buried. They were of elliptical shape, considerably larger than those of a duck, and having a
30 hard shell of the texture of porcelain, but very rough on

the outside. They make a loud sound when rubbed together, and it is said that it is easy to find a mother alligator in the Ygapó forests by rubbing together two eggs in this way, she being never far off, and attracted by the sounds.



Photo by E. H. Fletcher

From the Manchester Grammar School Museum

ALLIGATOR'S EGG AND TWO YOUNG ALLIGATORS.
(One-foot scale in front.)

CHAPTER IX

FAUNA OF THE FOREST (*Continued*)

OTHER REPTILES

Turtles

THE great fresh-water turtle of the Amazons grows on the Upper river to an immense size, a full-grown one measuring nearly three feet in length by two in breadth, a load for the strongest Indian. Every house has a little pond, called a curral, in the backyard, to hold a stock of the animals through the season of dearth—the wet months; those who have a number of Indians in their employ send them out for a month when the waters are low, to collect a stock, and those who have not, 10 purchase a supply; with some difficulty, however, as they are rarely offered for sale. The price of turtles, like that of all other articles of food, rose greatly with the introduction of steam-vessels. When I arrived in 1850 a middle-sized one could be bought pretty readily for ninepence, but when I left in 1859 they were with difficulty obtained at eight or nine shillings each. When the river sinks less than the average, they are scarce; but when more, they can be caught in plenty, the bays and shallow lagoons in the forest having then only a 20 small depth of water. The flesh is very tender, palatable,

and wholesome ; but it is very cloying ; every one ends, sooner or later, by becoming thoroughly surfeited. The smaller kind of turtle, which makes its appearance in the main river, and lays its eggs a month earlier than the large species, is of less utility to the inhabitants, although its flesh is superior, on account of the difficulty of keeping it alive ; it survives captivity but a very few days, although placed in the same ponds in which the large turtle keeps well for two or three years.

Breeding-place of the Turtle

In the course of our wanderings in the Solimoens, we 10 visited the sand-islands, the turtle-pools in the forests, and the by-streams and lakes of the great desert river. There are four of these sand-islands within the Ega district, all of which are visited annually for the purpose of collecting turtle-eggs and extracting oil from their yolks. Each has its commander, whose business is to make arrangements for securing to every inhabitant an equal chance in the egg-harvest, by placing sentinels to protect the turtle when laying, and so forth.

The turtles descend from the interior pools to the 20 main river in July and August, before the outlets dry up, and then seek in countless swarms their favourite sand-islands ; for it is only a few that are selected by them out of a great number existing. The young animals remain in the pools throughout the dry season. These breeding-places of turtles then lie twenty to thirty feet above the level of the river, and are accessible only by cutting roads through the dense forest.

Great precautions have to be taken to avoid disturbing the sensitive turtles, who, previous to crawling ashore 30

to lay, assemble in great numbers off the sandbank. The men take care not to shew themselves, and warn off any fisherman who wishes to pass near the place. Their fires are made in a deep hollow near the borders of the forest, so that the smoke may not be visible. The passage of a boat through the shallow waters where the animals are congregated, or the sight of a man or a fire on the sandbank, would prevent the turtles from leaving the water that night to lay their eggs, and if the causes
10 of alarm were repeated once or twice, they would forsake the sandbank for some quieter place.

For the purpose of watching the turtles the sentinels erected a stage about fifty feet high, on a tall tree near their station, the ascent to which was by a roughly-made ladder of woody lianas. They are enabled, by observing the turtles from this watch-tower, to ascertain the date of successive deposits of eggs, and thus guide the commandant in fixing the time for the general invitation to the Ega people. The turtles lay their eggs by night,
20 leaving the water when nothing disturbs them, in vast crowds, and crawling to the central and highest part of the sandbank. The hours between midnight and dawn are the busiest. The turtles excavate, with their broad webbed paws, deep holes in the fine sand; the first comer, in each case, making a pit about three feet deep, laying its eggs (about 120 in number) and covering them with sand; the next making its deposit at the top of that of its predecessor, and so on until every pit is full.

I rose from my hammock by daylight, shivering with
30 cold, and went to join my friends. Few recollections of my American rambles are more vivid and agreeable than that of my walk over the white sea of sand on this



Photo by Dr W T Councilman.

By kind permission

ON THE MARANON (UPPER AMAZON).
Silk-cotton tree on bank probably 160 feet high.

N. A.

K

- cool morning. The sky was cloudless ; the just-risen sun was hidden behind the dark mass of woods, but the long thin line of forest to the west, with its plummy decorations of palms, was lighted up with his yellow, horizontal rays. A faint chorus of singing birds reached the ears from across the water, and flocks of gulls and plovers were crying plaintively over the swelling banks, where their eggs lay in nests made in little hollows of the sand. Tracks of stray turtles were visible on the
- 10 smooth white surface. The animals which thus wander from the main body are lawful prizes of the sentinels ; they had caught in this way two before sunrise. In my walk I disturbed several pairs of the chocolate and drab-coloured wild-goose, which set off to run along the edge of the water. The enjoyment one feels in rambling over these free, open spaces, is no doubt enhanced by the novelty of the scene, the change being very great from the monotonous landscape of forest which everywhere else presents itself.
- 20 On arriving at the edge of the forest I mounted the sentinel's stage, just in time to see the turtles retreating to the water on the opposite side of the sand-bank, after having laid their eggs. The sight was well worth the trouble of ascending the shaky ladder. They were about a mile off, but the surface of the sands was blackened with the multitudes which were waddling towards the river ; the margin of the bank was rather steep, and they all seemed to tumble head first down the declivity into the water.
- 30 On the 6th of October we left Ega on a second excursion, the principal object being, this time, to search certain pools in the forest for young turtles. The

exact situation of these hidden pools of water is known only to a few practised huntsmen. A large net, seventy yards in length, was carried to the place. The work was done very speedily, and when I went to the spot at eleven o'clock I found some of the older Indians had begun their sport. They were mounted on little stages, and were shooting the turtles as they came near the surface, with bows and arrows.

Shooting Turtles

The pool covered an area of about four or five acres, and was closely hemmed in by forest, which in picturesque 10 variety and grouping of trees and foliage exceeded almost everything I had yet witnessed. The margins for some distance were swampy, and covered with large tufts of fine grass. These tufts in many cases were over-run with ferns, and exterior to them a crowded row of arborescent arums, growing to a height of fifteen or twenty feet, formed a green palisade. Around the whole stood the taller forest-trees; palmate-leaved *Cecropiae*; slender Assai palms, thirty feet high, with their thin feathery heads crowning the gently-curving, smooth 20 stems; small fan-leaved palms; and as a background to all these airy shapes, lay the voluminous masses of ordinary forest-trees, with garlands, festoons, and streamers of leafy climbers hanging from their branches.

I was astonished at the skill which the Indians displayed in shooting turtles. They did not wait for their coming to the surface to breathe, but watched for the slight movements in the water, which revealed their presence underneath; the instant one was perceived, an arrow flew from the bow of the nearest man, and 30

never failed to pierce the shell of the submerged animal ; the marksman preferring a longish range, because the arrow then fell more perpendicularly on the shell and entered it more deeply.

The arrow used in turtle-shooting has a strong lancet-



Photographed from life by Graham Renshaw

OCELOT.

Bates's "Small tiger-cat."

shaped steel point, fitted into a peg, which enters the tip of the shaft. The peg is secured to the shaft by twine made of the fibres of pine-apple leaves, the twine being some thirty or forty yards in length, and neatly wound
10 round the body of the arrow. When the missile enters the shell the peg drops out, and the pierced animal descends with it towards the bottom, leaving the shaft floating on the surface. This being done, the sportsman paddles to the place, and gently draws the animal by the

twine, humouring it by giving it the rein when it plunges, until it is brought again to the surface, when he strikes it with a second arrow. With the increased hold given by the two cords he has then no difficulty in landing his gains.

By mid-day the men had shot a score of nearly full-grown turtles; orders were then given to spread the net. The net was taken by two Indians and extended in a curve at one extremity of the oval-shaped pool; its breadth was about equal to the depth of the water, its 10 shotted side therefore rested on the bottom, whilst the floats buoyed it up on the surface, so that the whole, when the ends were brought together, would form a complete trap. The man who remained with the boats could not turn the animals on their backs fast enough, so that a great many clambered out and got free again. However, about eighty were secured in about twenty minutes. Nearly all the animals were young ones, from three to ten years of age; they varied from six to eighteen inches in length, and were very fat.

20

Collecting Turtles' Eggs

The last of these minor excursions which I shall narrate, was made in the season when all the population of the villages turns out to dig up turtle eggs, and revel on the sand-banks. Placards were posted on the church doors at Ega, announcing that the excavation would commence on the 17th of October. We set out on the 16th, and passed on the way a large number of men, women, and children, in canoes of all sizes, wending their way as if to a great holiday gathering. By the morning of the 17th. some four hundred persons were assembled on the 30

borders of the sand-bank ; each family having erected a rude temporary shed of poles and palm leaves to protect themselves from the sun and rain. Large copper kettles to prepare the oil, and hundreds of red earthenware jars, were scattered about on the sand.

It was an animating sight to behold the wide circle of rival diggers throwing up clouds of sand in their energetic labours, and working gradually towards the centre of the ring. A little rest was taken during the
10 great heat of the day, and in the evening the eggs were carried to the huts in baskets. By the end of the second day large mounds of eggs, some of them four to five feet in height, were seen by the side of each hut, the produce of the labours of the family.

The eggs, which are quite round, and somewhat larger than a hen's egg, have a flexible, or leathery shell. The whole heap is thrown into an empty canoe and mashed with wooden prongs ; sometimes naked Indians and children jump into the mass and tread it down. This
20 being finished, water is poured into the canoe, and the fatty mess is then left for a few hours to be heated by the sun, on which the oil separates and rises to the surface, and is afterwards skimmed off with long spoons, and purified over the fire in copper kettles.

The destruction of turtle eggs every year by these proceedings is enormous. At least 6 000 jars, each holding three gallons of the oil, are exported annually from the Upper Amazons and the Madeira to Pará, where it is used for lighting, frying fish, and other purposes.
30 It may be fairly estimated that 2,000 more jars-full are consumed by the inhabitants of the villages on the river. Now it takes at least twelve baskets of eggs, or about

6,000, by the wasteful process followed, to make one jar of oil. The total number of eggs annually destroyed, therefore, amounts to 48,000,000. As each turtle lays about 120, it follows that the yearly offspring of 400,000



Photo by R. H. Fletcher.

From the Manchester Grammar School Museum

BLACK SPIDER-MONKEY.

(*Ateles Ater.*)

Note absence of thumb on fore-limbs.

turtles is thus annihilated. The chief natural enemies of the turtle are vultures and alligators, which devour the newly-hatched young as they descend in shoals to the water. The universal opinion of the settlers on the Upper Amazons is, that the turtle has very greatly decreased in numbers, and is still annually decreasing. 10

CHAPTER X

FAUNA OF THE FOREST (*Continued*)

OTHER REPTILES

Snakes

IN the wet season serpents are common in the neighbourhood of Pará. One morning, in April, 1849, after a night of deluging rain, the lamplighter, on his rounds to extinguish the lamps, knocked me up to shew me a boa-constrictor he had just killed in the street, not far from my door. He had cut it nearly in two with a large knife, as it was making its way down the sandy street. Sometimes the native hunters capture boa-constrictors alive in the forest near the city. We bought one which
10 had been taken in this way, and kept it for a long time in a box under our verandah. This is not, however, the largest or most formidable serpent found in the Amazons region. It is far inferior in these respects to the Water Boa, which sometimes attacks man.

It frequently happened, in passing through the thickets, that a snake would fall from the boughs close to me. Once I got for a few moments completely entangled in the folds of one, a wonderfully slender kind, being nearly six feet in length, and not more than half
20 an inch in diameter at its broadest part.

The majority of the snakes seen were innocuous. One day, however, I trod on the tail of a young serpent belonging to a very poisonous kind, the Jararaca. It turned round and bit my trousers, and a young Indian lad, who was behind me, dexterously cut it through with his knife before it had time to free itself. In some seasons snakes are very abundant, and it often struck me as strange that accidents did not occur more frequently than was the case.

Slow-worm

Amongst the most curious snakes found here are those 10 of a genus allied to the slow-worm of Europe. Those brought to me were generally not much more than a foot in length. They live habitually in the subterranean chambers of the Saüba ant, only coming out of their abodes occasionally in the night time. The natives say that the ants treat it with great affection. I once took one quite whole out of the body of a young Jararaca, whose body was so distended with its contents that the skin was stretched out to a film over the contained slow-worm. I believe they feed upon the Saübas, for I 20 once found the remains of ants in the stomach of one of them.

Rattlesnake

In the dry forests of Villa Nova I saw a rattlesnake for the first time. I was returning home one day through a narrow alley, when I heard a pattering noise close to me. The wind lulled for a few moments, and then there was no doubt that the noise proceeded from the ground. On turning my head in that direction a sudden plunge

startled me, and a heavy gliding motion betrayed a large serpent making off almost from beneath my feet. The residents of Villa Nova would not believe that I had seen a rattlesnake in their neighbourhood; in fact, it is not known to occur in the forest at all, its place being the open campos, where, near Santarem, I killed several.

On my second visit to Villa Nova I saw another. I had then a favourite little dog who used to accompany me in my rambles. One day he rushed into the thicket, 10 and made a dead set at a large snake, whose head I saw raised above the herbage. The foolish little brute approached quite close, and then the serpent reared its tail slightly in a horizontal position and shook its terrible rattle. It was many minutes before I could get the dog away; and this incident, as well as the one already related, shews how slow the reptile is to make the fatal spring.

On another occasion I was very near treading on a rattlesnake, which lay stretched out nearly in a straight 20 line on the bare sandy pathway. It made no movement to get out of the way, and I escaped the danger by a timely and sudden leap, being unable to check my steps in the hurried walk. We tried to excite the reptile by throwing handfuls of sand and sticks at it, but the only notice it took was to raise its ugly horny tail and shake its rattle.

Anaconda

On our voyage up the Tapajos, we once had an unwelcome visitor while at anchor. I was awakened a little after midnight, as I lay in my little cabin, by a 30 heavy blow struck at the sides of the canoe close to my

head, which was succeeded by the sound of a weighty body plunging in the water. Next morning I found my poultry loose about the canoe, and a large rent in the



Photo by R. H. Fletcher. From the Liverpool Public Museums. By kind permission

TWO COMMON SQUIRREL MONKEYS (right).

(*Chrysothrix sciurea*)

and

TWO BLACK-HEADED SQUIRREL MONKEYS (left).

(*Chrysothrix entomophaga*.)

bottom of the hen-coop, which was about two feet from the surface of the water ; a couple of fowls were missing. The depredator was an Anaconda, or great water serpent, which had for months past been haunting this part of the river, and had carried off many ducks and fowls from the ports of various houses.

Some days afterwards the young men agreed to go in search of the serpent. The reptile was found at last, sunning itself on a log at the mouth of a muddy rivulet, and despatched with harpoons. It was not a very large specimen, measuring only eighteen feet nine inches in length, and sixteen inches in circumference at the widest part of the body. I measured skins of the Anaconda afterwards, twenty-one feet in length and two feet in girth. The reptile has a most hideous appearance, owing to its being very broad in the middle and tapering abruptly at both ends. Near Santarem it is often seen coiled up in the corners of farm-yards, and is detested for its habit of carrying off poultry, young calves, or whatever animal it can get within reach of.

At Ega a large Anaconda was once near making a meal of a young lad about ten years of age, belonging to one of my neighbours. The father and his son went, as was their custom, a few miles up the river to gather wild fruit ; landing on a sloping sandy shore, where the boy was left to mind the canoe whilst the man entered the forest. While the boy was playing in the water under the shade of the trees, a huge reptile of this species stealthily wound its coils around him, unperceived until it was too late to escape. His cries brought the father quickly to the rescue ; who rushed forward, and seizing the Anaconda boldly by the head, tore his jaws asunder.

I heard of specimens having been killed which measured forty two feet in length.

Toads

A great number of toads are seen on the bare sandy



Photo by P G Howes.

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GIANT MARINE TOAD.

pathways soon after sunset. One of them was quite a colossus, about seven inches in length and three in height. This big fellow would never move out of the way unless we were close to him. If we jerked him out of the path with a stick, he would slowly recover himself, and then turn round to have a good impudent stare. I have counted as many as thirty of these monsters 10 within a distance of half a mile.

CHAPTER XI

FISH

THERE was a mode of taking fish on the Tapajos which I had not before seen employed, but found afterwards to be very common. This is by using a poisonous liana. It will act only in the still waters of creeks and pools. A few rods, a yard in length, are mashed and soaked in the water, which quickly becomes discoloured with the juice of the plant. In about half an hour all the smaller fishes, over rather a wide space round the spot, rise to the surface floating on their sides, and with the gills wide
10 open.

Spearing Fish

The shallow lakes and bays here contain plenty of fish in the dry season, and the boys and women go out at night to spear them by torchlight ; the torches being made of thin strips of green bark from the leaf-stalks of palms, tied in bundles. Many excellent kinds of fish are thus obtained. amongst them one whose white and flaky flesh, when boiled, has the appearance and flavour of cod-fish ; many small salmon are also found and a kind of sole, which moves along the clear sandy
20 bottom of the bay. At these times a species of sting-ray is common on the sloping beach, and bathers are frequently

stung most severely by it. The weapon of this fish is a strong blade with jagged edges, about three inches long, growing from the side of the long fleshy tail. I once saw a woman wounded by it whilst bathing; she shrieked frightfully, and was obliged to be carried to her hammock, where she lay for a week in great pain; I have known strong men to be lamed for many months by the sting.

Needle-fish

One port where our boat anchored swarmed with fishes, whose movements it was amusing to watch in 10 the deep, clear water. Sometimes little troops of needle-fish, eel-like animals with excessively long and slender toothed jaws, sailed through the field, scattering before them the hosts of smaller fry; and in the rear of the needle-fishes a strangely-shaped kind came wriggling along, one by one, with a slow movement.

Electric Eel

The dry bed of a creek near Ega was pierced by a number of round holes filled with muddy water. As we approached the larger ones, I was startled at seeing a number of large serpent-like heads bobbing about the 20 surface. They proved to be those of electric eels, and it now occurred to me that the round holes were made by these animals working constantly round and round in the moist muddy soil.

I amused my companions very much by shewing how the electric shock from the eels could pass from one person to another. We joined hands in a line whilst I

touched the biggest and freshest of the animals on the head with the point of my hunting-knife. We found that the experiment did not succeed more than three times with the same eel when out of the water ; for, the fourth time, the shock was scarcely perceptible.

CHAPTER XII

INVERTEBRATE FAUNA OF THE AMAZON FORESTS

SPIDERS

MANY species of those monstrous hairy spiders, half a foot in expanse, which attract so much attention in museums, are found in sandy places near Pará. The different kinds have the most diversified habits. Some construct, amongst the tiles or thatch of houses, dens of closely woven web, which, in its texture, very much resembles fine muslin; these are often seen crawling over the walls of apartments. Others build similar nests in trees, and are known to attack birds. One very robust fellow burrows into the earth, forming a broad, 10 slanting gallery, about two feet long, the sides of which he lines beautifully with silk. He is nocturnal in his habits. Just before sunset he may be seen keeping watch within the mouth of his tunnel, disappearing suddenly when he hears a heavy foot-tread near his hiding-place.

The number of spiders ornamented with showy colours was somewhat remarkable. Some double themselves up at the base of leaf-stalks, so as to resemble flower-buds, and thus deceive the insects on which they prey. The most extraordinary-looking spider was a 20 species of *Acrosoma*, which had two curved bronze-

coloured spines, an inch and a half in length, proceeding from the tip of its abdomen. It spins a large web, the monstrous appendages being apparently no hindrance to it in its work ; but what their use can be I am unable to divine.

Bird-catching Spider

At Cametá I chanced to verify a fact relating to the habits of a very large hairy spider, in a manner worth recording. The individual was nearly two inches in length of body, but the legs expanded seven inches, and
10 the entire body and legs were covered with coarse grey and reddish hairs. I was attracted by a movement of the monster on a tree-trunk ; it was close beneath a deep crevice in the tree, across which was stretched a dense white web. The lower part of the web was broken, and two small birds, finches, were entangled in the pieces ; they were about the size of the English siskin, and I judged the two to be male and female. One of them was quite dead, the other lay under the body of the spider, not quite dead, and was smeared with the
20 filthy liquor or saliva exuded by the monster. I drove away the spider, and took the two birds, but the second soon died. These spiders are quite common : some are of immense size. One day I saw the children belonging to an Indian family, who collected for me, with one of these monsters secured by a cord round its waist, by which they were leading it about the house as they would a dog.

Beetles

Beetles at first seemed to be very scarce. This apparent scarcity has been noticed in other equatorial

countries, and arises, probably, from the great heat of the sun not permitting them to exist in exposed situations, where they form such conspicuous objects in Europe. Many hundred species of the different kinds



Photo R. H. Fletcher.

From the Liverpool Public Museums By kind permission

BIRD-CATCHING SPIDER.

(*Mygalæ*.)

can be found, when they are patiently searched for in the shady places to which they are confined. It is vain to look for the carnivorous beetles under stones, or anywhere, indeed, in open, sunny places. The terrestrial species are scarce in the neighbourhood of Pará, in fact, I met with only four or five species; on the other hand, 10 the purely arboreal kinds were rather numerous. The

contrary of this happens in northern latitudes. The arboreal forms are distinguished by the structure of the feet, which have broad spongy soles and toothed claws, enabling them to climb over and cling to branches and leaves.

The remarkable scarcity of ground-beetles is, doubtless, attributable to the number of ants which people every inch of surface in all shady places, and which would most likely destroy the larvae of beetles. The large
10 proportion of climbing forms of carnivorous beetles is an interesting fact, because it affords another instance of the arboreal character which animal forms tend to assume in equinoctial America, a circumstance which points to the slow adaptation of the Fauna to a forest-clad country throughout an immense lapse of geological time.

CHAPTER XIII

INVERTEBRATE FAUNA OF THE FOREST (*Continued*)

BEES AND WASPS

IN the lower part of the woods near Santarem, towards the river, there is a bed of stiff white clay, which supplies the people of Santarem with material for the manufacture of coarse pottery and cooking utensils. The shallow pits excavated in this marly soil were very attractive to many kinds of mason bees and wasps, who made use of the clay to build their nests. We have here an example of the curious analogy that exists between the arts of insects and those of man. I spent many an hour watching their proceedings.

10

The most conspicuous was a large yellow and black wasp, with a remarkably long and narrow waist. This species collected the clay in little round pellets, which it carried off, after rolling them into a convenient shape, in its mouth. It came straight to the pit with a loud hum, and on alighting, lost not a moment in beginning to work, finishing the kneading of its little load in two or three minutes. The nest of this wasp is shaped like a pouch, two inches in length, and is attached to a branch or other projecting object.

20

One of these restless artificers began to build on the handle of a chest in the cabin of my canoe, when we

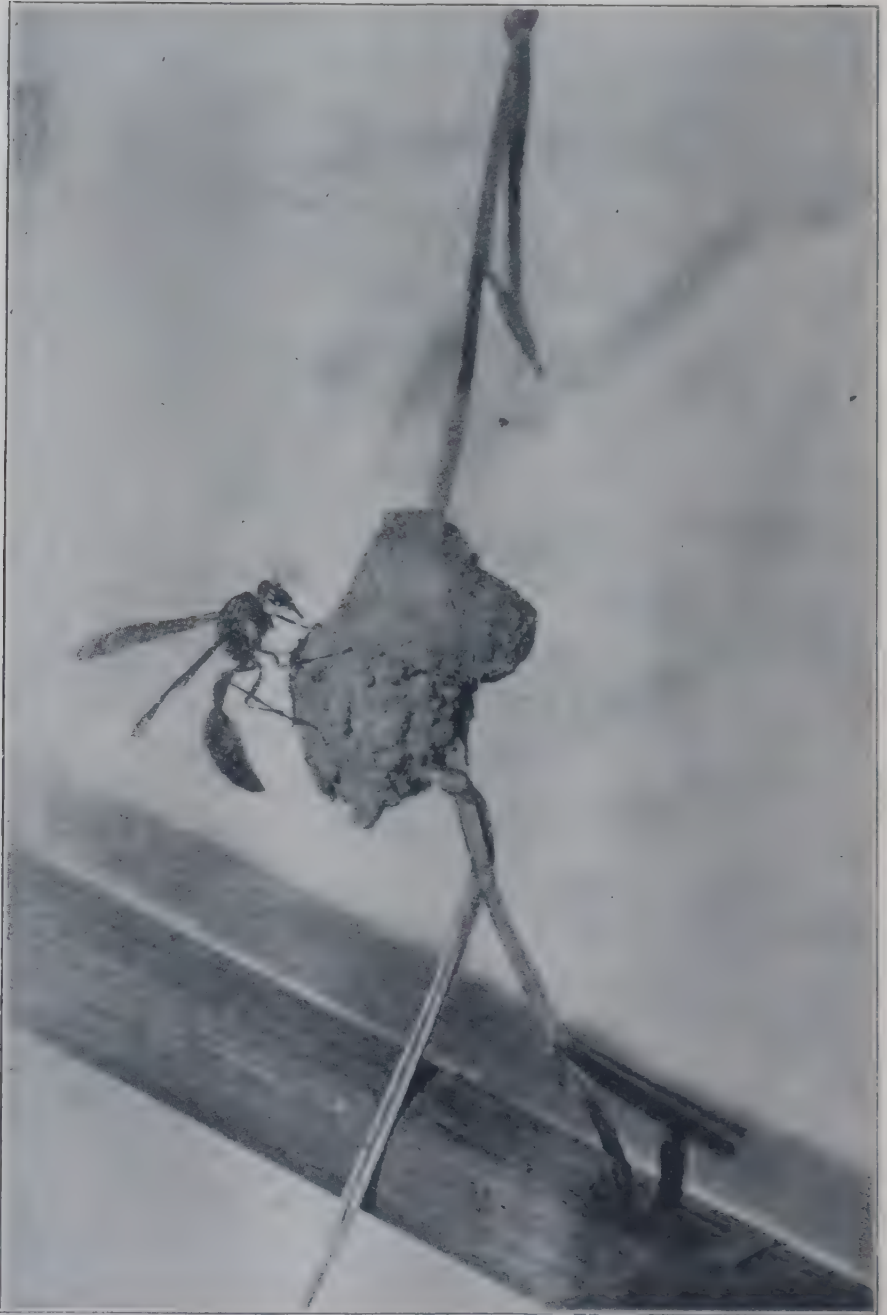


Photo by P G Howes.

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POTTER-WASP (Buff *Eumenes*) RESTING ON HER NEST.

were stationary at a place for several days. It was so intent on its work that it allowed me to inspect the movements of its mouth with a lens whilst it was laying on the mortar. Every fresh pellet was brought in with a triumphant song, which changed to a cheerful busy hum when it alighted and began to work. The little ball of moist clay was laid on the edge of the cell, and then spread out around the circular rim by means of the lower lip guided by the mandibles. The insect placed itself astride over the rim to work, and on finishing each 10 addition to the structure, took a turn round, patting the sides with its feet inside and out, before flying off to gather a fresh pellet. It worked only in sunny weather, and the previous layer was sometimes not quite dry when the new coating was added. The whole structure takes about a week to complete. On opening closed nests of this species, I always found them stocked with small spiders, in the usual half-dead state to which the mother wasps reduce the insects which are to serve as food for their progeny. One small species makes a neat 20 little nest shaped like a carafe, building rows of them together in the corners of verandahs.

But the most numerous and interesting of the clay artificers are the workers of a species of social bee ; they are generally much smaller than the hive-bees, and have no sting. The colonies are composed of an immense number of individuals ; the workers are generally seen collecting pollen in the same way as other bees, but great numbers are employed gathering clay. The rapidity and precision of their movements while thus 30 engaged are wonderful. They first scrape the clay with their jaws ; the small portions gathered are then cleared

by the anterior paws and passed to the second pair of feet, which, in their turn, convey them to the large foliated expansions of the hind shanks, which are adapted normally in bees, as every one knows, for the collection of pollen. The middle feet pat the growing pellets of mortar on the hind legs to keep them in a compact



Photo by P. G. Howes.

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NEST OF THE SOLITARY POTTER-WASP (Red *Eumenes*).

(Each jug serves as a nursery for a single wasplet, and is provisioned with ten paralysed Span-worms. The lower row is photographed to a different scale. The greatest diameter of a pitcher is about one inch.)

shape as the particles are successively added. The little hodmen soon have as much as they can carry, and they then fly off

- 10 I was for some time puzzled to know what the bees did with the clay; but I had afterwards plenty of opportunity for ascertaining. They construct their combs in any suitable crevice in trunks of trees or perpendicular banks, and the clay is required to build up a wall so as to close the gap, with the exception of a small orifice for their own entrance and exit. One little

species builds a neat tubular gallery of clay ; the mouth of the tube is trumpet-shaped, and at the entrance a number of pigmy bees are always stationed, apparently acting as sentinels.

Whilst resting in the shade during the great heat of the early hours of afternoon, I used to find amusement in watching the proceedings of the sand wasps. When they are at work, a number of little jets of sand are seen shooting over the surface of the sloping bank. The little miners excavate with their fore-feet, which are 10 strongly built and furnished with a fringe of stiff bristles ; they work with wonderful rapidity, and the sand thrown out beneath their bodies issues in continuous streams. They are solitary wasps, each female working on her own account. After making a gallery two or three inches in length, in a slanting direction from the surface, the owner backs out and takes a few turns round the orifice, apparently to see if it is well made, but in reality, I believe, to take note of the locality, that she may find it again. This done, the busy workwoman flies away ; 20 but returns, after an absence varying in different cases from a few minutes to an hour or more, with a fly in her grasp, with which she re-enters her mine. On her again emerging, the entrance is carefully closed with sand. During this interval she has laid an egg on the body of the fly which she had previously benumbed with her sting, and which is to serve as food for the soft, footless grub soon to be hatched from the egg. From what I could make out, the creature makes a fresh excavation for every egg to be deposited.

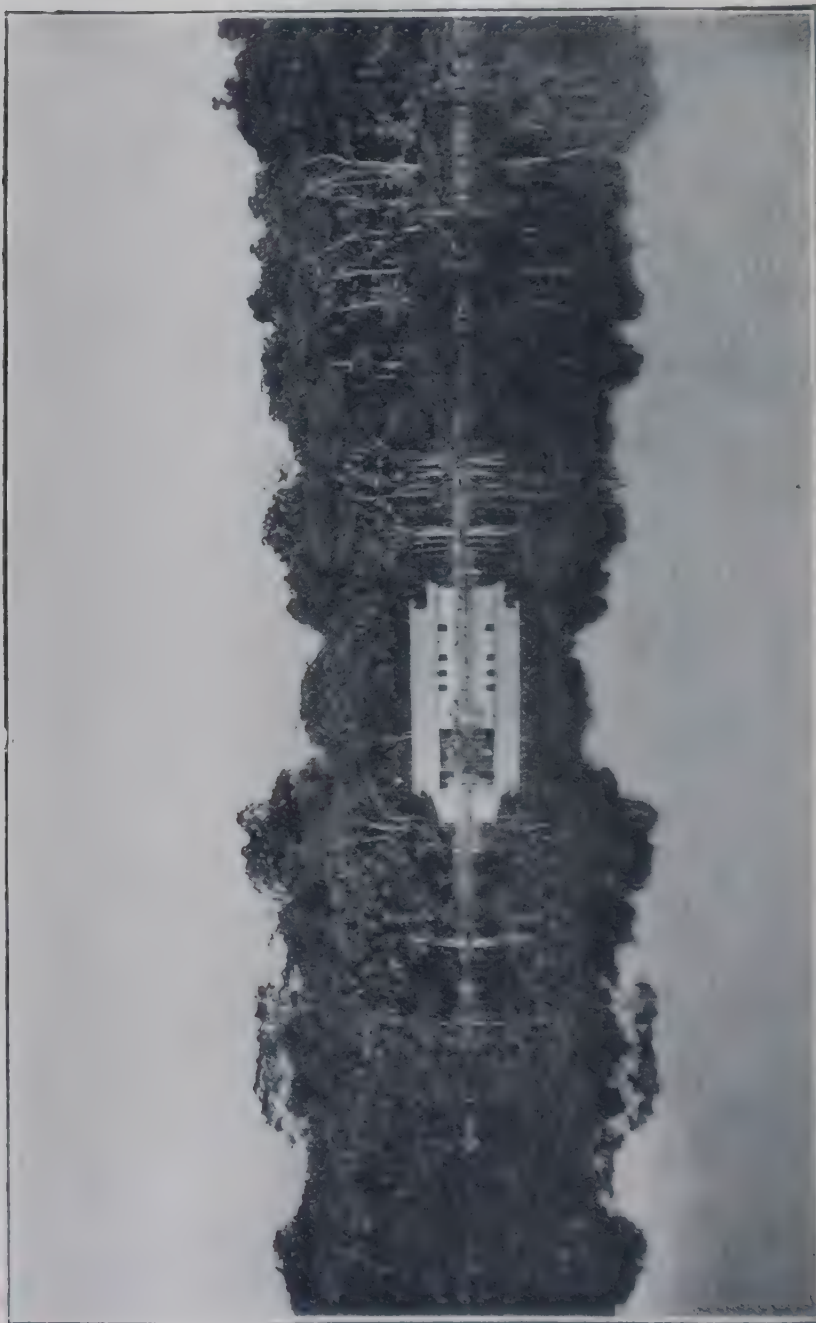


Photo by Dr W T Connellman

PLANTER'S STORE: BOYA-ASSU, LOW COUNTRY.

By kind permission

Butterflies

The neighbourhood of Obydos was rich in insects. In the broad alleys of the forest a magnificent butterfly, six to eight inches in expanse, was seen daily gliding along at a height of twenty feet or more from the ground. Amongst the lower trees and bushes a group of butterflies having long narrow wings were very abundant. The prevailing ground colour of the wings of these insects is a deep black, and on this are depicted spots and streaks of crimson, white, and bright yellow, in different patterns according to the species. Their elegant shape, showy 10 colours, and slow, sailing mode of flight make them very attractive objects, and their numbers are so great that they form quite a feature in the physiognomy of the forest, compensating for the scarcity of flowers.

Next to these the genus *Catagramma* was the most conspicuous. The colours of the wings are vermillion and black, the surface having a rich velvety appearance. The genus owes its Greek name (signifying "a letter beneath") to the curious markings of the underside of the wings, resembling Arabic numerals. Another butter- 20 fly nearly allied to these, *Callithea*, was also very abundant here. The wings are of a rich dark-blue colour, with a broad border of silvery green. These two groups of *Callithea* and *Catagramma* are found only in tropical America, chiefly near the equator, and are certainly amongst the most beautiful productions of a region where the animals and plants seem to have been fashioned in Nature's choicest moulds.

As the waters retreated from the beach, vast numbers of sulphur-yellow and orange-coloured butterflies con- 30

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gregated on the moist sand. They assembled in densely-packed masses, sometimes two or three yards in circumference, their wings all held in an upright position, so that the beach looked as though variegated with beds of crocuses. These seem to be migratory insects, and have large powers of discrimination. During the last two days of our voyage the great numbers constantly passing over the river attracted the attention of every one on board. They all crossed in one direction, namely,
10 from north to south, and the processions were uninterrupted from an early hour in the morning until sunset.

It is a grand sight to see the colossal *Morpho* butterflies by twos and threes floating at a great height in the still air of a tropical morning. The largest specimens measure seven inches and a half in expanse. They flap their wings only at long intervals, for I have noticed them to sail a very considerable distance without a stroke.

Upwards of 7000 species of insects were found in the
20 neighbourhood of Ega. I found about 550 distinct species of butterflies at Ega itself. Eighteen species of the swallow-tail genus were found within ten minutes' walk of my house. No fact could speak more plainly for the surpassing exuberance of the vegetation, the varied nature of the land, the perennial warmth and humidity of the climate. But no description can convey an adequate notion of the beauty and diversity in form and colour of this class of insects in the neighbourhood of Ega. I paid especial attention to them, having found
30 that this tribe was better adapted than almost any other group of animals or plants to furnish facts in illustration of the modifications which all species undergo in nature,

under changed local conditions. The wings are clothed with minute feathers or scales, coloured in regular patterns, which vary in accordance with the slightest change in the conditions to which the species are exposed. It may be said, therefore, that on these expanded membranes Nature writes, as on a tablet, the story of the modifications of species, so truly do all the changes of the organisation register themselves thereon. Moreover, the same colour-patterns of the wings generally show, with great regularity, the degrees of relationship 10 of the species. Thus the study of butterflies will some day be valued as one of the most important branches of biological science.

Crickets

A strange kind of wood-cricket is found in the neighbourhood of Obydos, the males of which produce a very loud and not unmusical noise by rubbing together the overlapping edges of their wing-cases. The notes are certainly the loudest and most extraordinary that I ever heard produced by these insects. The natives call it the Tanana,⁷ in allusion to its music, which is a sharp 20 resonant stridulation resembling the syllables ta-na-ná, ta-na-ná, succeeding each other with little intermission. It seems to be rare in the neighbourhood. When the natives capture one, they keep it in a wicker-work cage for the sake of hearing it sing. A friend of mine kept one six days. It was lively only for two or three, and then its loud note could be heard from one end of the village to the other. The total length of the body is two inches and a quarter.

The instrument by which the Tanana produces its 30

music is curiously contrived out of the ordinary nervures of the wing-cases. The mode of producing the sounds and their object have been investigated by several authors. They are the call-notes of the males. In the



Photo by P G Howes.

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MOLE-CRICKET AND YOUNG.

common field-cricket of Europe the male has been observed to place itself, in the evening, at the entrance of its burrow, and stridulate until a female approaches, when the louder notes are succeeded by a more subdued tone, whilst the successful musician caresses with his
10 antennae the mate he has won. Anyone who will take the trouble may observe a similar proceeding in the common house-cricket.

Mosquitoes

A mosquito-tent was indispensable in all excursions beyond Ega, every person, man, woman, and child, requiring one, as without it existence would be scarcely possible. My tent was about eight feet long and five feet broad, and was made of coarse calico in an oblong shape, with sleeves at each end, through which to pass the cords of a hammock. Under this shelter, which is fixed up every evening before sundown, one can read and write, or swing in one's hammock during the long hours that intervene before bedtime, and feel one's 10 sense of comfort increased by having cheated the thirsty swarms of mosquitoes which fill the chamber.

Fonte Boa, on the Amazon, more than a hundred miles above Ega, in addition to its other amenities, has the reputation throughout the country of being the headquarters of the mosquitoes, and it fully deserves the title. They are more annoying in the houses by day than by night, for they swarm in the dark and damp rooms, keeping, in the daytime, near the floor, and settling by half-dozens together on the legs. At night the calico 20 tent is a sufficient protection; but this is obliged to be folded every morning, and in letting it down before sunset, great care is required to prevent even one or two of the tormentors from stealing in beneath; their insatiable thirst for blood, and pungent sting, making these enough to spoil all comfort.

In the forest the plague is much worse; but the forest-mosquito belongs to a different species from that of the town, being much larger, and having transparent wings; it is a little cloud that one carries about one's person 30

every step on a woodland ramble, and their hum is so loud that it prevents one from hearing well the notes of birds. The town mosquito has opaque speckled wings, a less severe sting, and a silent way of going to work ; the inhabitants ought to be thankful the big noisy fellows never come out of the forest.

CHAPTER XIV

INVERTEBRATE FAUNA OF THE FOREST (*Continued*)

ANTS

The Saüba Ant

THE Saüba ant—mentioned in an earlier chapter—is quite peculiar to tropical America, as is the entire genus to which it belongs. It is a most interesting sight to see the vast host of these busy diminutive labourers at work, clipping and carrying away immense quantities of leaves. When they are so employed, their processions look like a multitude of animated leaves on the march. Unfortunately, they choose cultivated trees for their purpose. They mount the tree in multitudes, the individuals being all worker-minors. Each one places 10 itself on the surface of a leaf, and cuts with its sharp scissor-like jaws a nearly semicircular incision on the upper side; it then takes the edge between its jaws, and by a sharp jerk detaches the piece. Sometimes they let the leaf drop to the ground, where a little heap accumulates, until carried off by another relay of workers; but generally, each marches off with the piece it has operated upon, and as all take the same road to their colony, the path they follow becomes in a short time smooth and

bare, looking like the impression of a cart-wheel through the herbage.

The use to which the ants apply the leaves I discovered only after much time spent in investigation. The leaves are used to thatch the domes that cover the entrances to their dwellings, thereby protecting from the deluging rains the young broods in the nests beneath. The heavily-laden workers, each carrying its segment of leaf vertically, troop up and cast their burdens on the hillock ;
10 another relay of labourers place the leaves in position, covering them with a layer of earthy granules, which are brought one by one from the soil beneath.

The underground abodes of this wonderful ant are known to be very extensive. An allied species has been known to drive a tunnel under a river as broad as the Thames at London Bridge. They once pierced the bank of a large reservoir ; the great body of water which it contained escaped before the damage could be repaired. An enterprising gardener tried to extirpate the Saüba
20 by blowing fumes of sulphur down the galleries by means of bellows. I saw the smoke issue from a great number of outlets, one of which was seventy yards distant from the place where the bellows were used. This shows how extensively the underground galleries are ramified.

Besides injuring and destroying young trees, the Saüba ant is troublesome from its habit of plundering the stores of provisions in houses at night. One night my servant woke me three or four hours before sunrise. I took a light and went into the store-room, which was
30 close to my sleeping-place. I there found a broad column of Saüba ants, consisting of thousands of individuals, as busy as possible, passing to and fro between



Photo by Dr W T Councilman

By kind permission

PALM WITH CLASPING PARASITIC FIG.

the door and my precious baskets of farinha. Most of those passing outwards were laden each with a grain of farinha, which was, in some cases, larger and many times heavier than the bodies of the carriers. It was amusing to see some of the dwarfs, the smallest members of their family, staggering along, completely hidden under their load. They returned the next night; and I was then obliged to lay trains of gunpowder along their line and blow them up.

- 10 It is one of the great peculiarities of the Saüba ant to possess three classes of workers. When engaged in leaf-cutting, two classes are always seen. All the work is done by the individuals which have small heads; whilst those which have enormously large heads, the worker-majors, are simply walking about. I could never satisfy myself as to the function of these worker-majors. The third order of workers is the most curious of all. If the top of a small fresh hillock be taken off, a broad cylindrical shaft is disclosed, at a depth of about two feet from the
- 20 surface. If this be probed with a stick, a small number of colossal fellows will slowly begin to make their way up the smooth side of the mine. They have in the middle of the forehead a twin ocellus, or simple eye, of quite different structure from the ordinary compound eyes: reminding me, when I first observed them, of the Cyclopes of Homeric fable. What their special functions may be I cannot divine.

Meaning of the Activity of Ants

The whole arrangement of an ant-colony, and all the varied activity of ant-life, are directed to one main

30 purpose—the perpetuation and dissemination of the

species. Most of the labour which we see performed by the workers has for its end the sustenance and welfare of the young brood, which are helpless grubs. The



Photographed from life by Graham Renshaw.

ARMADILLO.

true females are incapable of attending to the wants of their offspring, and it is on the poor workers that the entire care devolves. The workers are also the chief agents in carrying out the different migrations of the colonies, which are of vast importance to the dispersal and consequent prosperity of the species.

It is amusing to see the activity and excitement which reign in an ant's nest when the exodus of the winged

individuals is taking place. The workers clear the roads of exit, and shew the most lively interest in their departure. The swarming or exodus of the winged males and females of the Saüba takes place in January and February, that is, at the commencement of the rainy season. They come out in the evening in vast numbers, causing quite a commotion in the streets and lanes. They are of very large size, the female measuring no less than two and a quarter inches in expanse of wing.

The Fire-ant

- 10 Aveyros on the Tapajos may be called the headquarters of the fire-ant, which might be fittingly termed the scourge of this fine river. The Tapajos is nearly free from the insect-pests of other parts, but the fire-ant is perhaps a greater plague than all the others put together. It seems to thrive most in the neighbourhood of houses, and does not occur at all in the shades of the forest. Aveyros was deserted a few years before my visit, on account of this little tormentor, and the inhabitants had only recently returned to their houses, thinking
20 its numbers had decreased. The soil of the whole village is undermined by it; the ground is perforated with the entrances to the subterranean galleries; the houses are overrun; the ants dispute every fragment of food with the inhabitants, and destroy clothing for the sake of the starch. All eatables have to be suspended in baskets from the rafters, and the cords well soaked with balsam: they seem to attack persons out of sheer malice; if we stood for a few moments in the street, even at a distance from their nests, we were sure to be over-
30 run and severely punished. for the moment an ant touched

the flesh, he secured himself with his jaws, doubled in his tail, and stung with all his might. When we were seated on chairs in the evening in the front of the house, to enjoy a chat with our neighbours, we had stools to support our feet, the legs of which, as well as those of the chairs, were well anointed with balsam. The cords of hammocks have to be smeared in the same way.

The exodus from their nests of the males and females takes place in June, at the end of the rainy season, when the swarms are blown into the river by squalls of wind, 10 and subsequently cast ashore by the waves. I was told that this wholesale destruction of ant-life takes place annually, and that the same compact heap of dead bodies which I saw only in part, extends along the banks of the river for twelve or fifteen miles.

Foraging Ants

The accounts which have been published regarding carnivorous ants, which hunt in vast armies, exciting terror wherever they go, apply only to the foraging ants, which must not be confounded with the Saüba. The Indians are always on the look-out for their armies, 20 when they traverse the forest, so as to avoid being attacked. I met with ten distinct species of them, nearly all of which have a different system of marching; eight were new to science when I sent them to England. They resemble, in their habits, the Driver ants, of tropical Africa; but they have no close relationship to them in structure, and indeed belong to quite another sub-group of the ant-tribe.

Like many other ants, the communities are composed, besides males and females, of two classes of workers, a 30

large-headed (worker-major) and a small-headed (worker-minor) class. The peculiar feature in the habits of the genus is their hunting for prey in regular bodies, or armies. It is this which chiefly distinguishes them from the genus of common red stinging-ants, several species of which inhabit England, whose habit is to search for food in the usual irregular manner. All the foraging ants hunt in large organised bodies; but almost every species has its own manner of hunting.

- 10 The giant of the genus, whose worker-majors are half an inch in length, hunts in single file through the forest. The chief employment of the species seems to be plundering the nest of a large and defenceless ant of another genus.

Another species, not differing greatly in size and colour from our common English red ant, lives in open spaces, and was only seen on the campos of Santarem. The armies consist of many thousands of individuals, and move in rather broad columns. The first time I saw an
20 army was one evening near sunset. The column consisted of two trains of ants moving in opposite directions; one train empty-handed, the other laden with the mangled remains of insects, chiefly larvae and pupae of other ants.

On the following morning, no trace of ants could be found near the place, but at the distance of eighty or one hundred yards, I came upon the same army, eagerly occupied, on the face of an inclined bank of light earth, in excavating mines, whence they were extracting the bodies of a bulky species of ant. In digging the numerous
30 mines to get at their prey, they seemed to be divided into small parties; one set excavating, and another set carrying away the grains of earth. When the shafts



Photo by Dr W T Connellman.

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CALABASH TREE (*Crescentia cujete*).

Vessels made from the gourd can be used for cooking over a fire.

became rather deep, the mining parties had to climb up the sides each time they wished to cast out a pellet of earth; but their work was lightened for them by comrades, who stationed themselves at the mouth of the shaft, and relieved them of their burdens, carrying the particles, with an appearance of foresight that quite staggered me, a sufficient distance from the edge of the hole to prevent them from rolling in again. All the work seemed thus to be performed by intelligent co-operation
10 amongst the host of eager little creatures; but still there was not a rigid division of labour, for some of them, whose proceedings I watched, acted at one time as carriers of pellets, and at another as miners, and all shortly assumed the office of conveyers of the spoil.

In about two hours all the nests were rifled of their contents, and I turned towards the army of ants, which were carrying away the mutilated remains. For some distance there were many separate lines of them, moving along the slope of the bank; but a short distance off,
20 these all converged, and then formed one close and broad column, which continued for some sixty or seventy yards, and terminated at one of those large hillocks of white ants which are constructed of cemented material as hard as stone. The broad and compact column of ants moved up the steep sides of the hillock in a continued stream; many, which had hitherto trotted along empty-handed, now turned to assist their comrades with their heavy loads, and the whole descended into a spacious gallery or mine opening on the top of the hillock.

30 When the pedestrian falls in with a train of foraging-ants, the first signal given him is a twittering and restless movement of small flocks of plain-coloured birds, the



Photo by Dr W T Connellman

By kind permission

ROOT SYSTEM OF BANYAN FIG.
(From Manaos.)

ant-thrushes, in the jungle. If this be disregarded until he advances a few steps further, he is sure to fall into trouble, and find himself suddenly attacked by numbers of the ferocious little creatures. They swarm up his legs with incredible rapidity, each one driving its pincer-like jaws into his skin, and with the purchase thus obtained, doubling in its tail, and stinging with all its might. There is no course left but to run for it; the tenacious insects which have secured themselves to his 10 legs then have to be plucked off one by one, a task which is generally not accomplished without pulling them in twain, and leaving head and jaws sticking in the wounds.

None of the foraging-ants have eyes of the compound structure such as are usual in insects, including ordinary ants, but all are provided with organs of vision composed each of a single lens, with the exception of the blind forager, in which species both eyes and eye-sockets have disappeared.

CHAPTER XV

FAREWELL TO THE AMAZONS

AT length, on the third of February, 1859, I left Ega, *en route* for England. I arrived at Pará on the 17th of March, after an absence in the interior of seven years and a half. My old friends, English, American, and Brazilian, scarcely knew me again, but all gave me a very warm welcome. I found Pará greatly changed and improved, and the habits of the people considerably altered.

At length, on the 2nd of June, I left Pará, probably for ever; embarking in a North-American trading vessel 10 for New York, the United States route being the quickest as well as the pleasantest way of reaching England. My extensive private collections were divided into three portions and sent by three separate ships, to lessen the risk of loss of the whole.

On the evening of the third of June, I took a last view of the glorious forest for which I had so much love, and to explore which I had devoted so many years. The saddest hours I ever recollect to have spent were those of the succeeding night, when, the pilot having left us 20 free of the shoals and out of sight of land though within the mouth of the river at anchor waiting for the wind, I felt that the last link which connected me with the

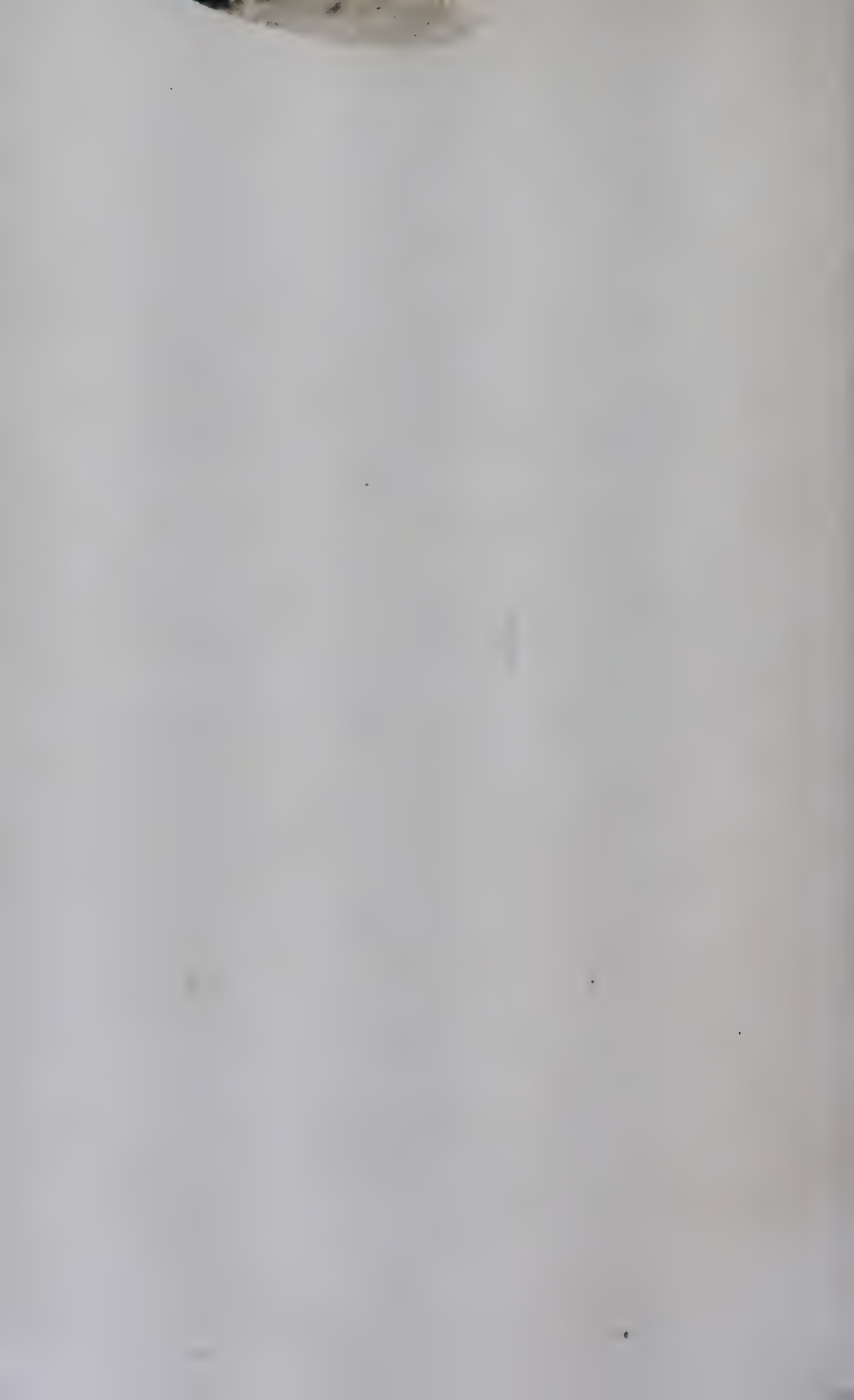
land of so many pleasing recollections was broken. The desire, however, of seeing again my parents and enjoying once more the rich pleasures of intellectual society, had succeeded in overcoming the attractions of a region which may be fittingly called a Naturalist's Paradise.

During this last night on the Pará river, a crowd of unusual thoughts occupied my mind. Recollections of English climate, scenery, and modes of life came to me with a vividness I had never before experienced, during
10 the eleven years of my absence. Pictures of startling clearness rose up of the gloomy winters, the long grey twilights, murky atmosphere, elongated shadows, chilly springs, and sloppy summers; of factory chimneys and crowds of grimy operatives, rung to work in early morning by factory bells; of union work-houses, confined rooms, artificial cares, and slavish conventionalities. To live again amidst these dull scenes I was quitting a country of perpetual summer, where my life had been spent like that of three-fourths of the people in gipsy
20 fashion, on the endless streams or in the boundless forests. I was leaving the equator, where the well balanced forces of nature maintained a land-surface and climate that seemed to be typical of mundane order and beauty to sail towards the North Pole, where lay my home under crepuscular skies somewhere about fifty-two degrees of latitude.

It was natural to feel a little dismayed at the prospects of so great a change, but now, after three years of renewed experience of England, I find how incomparably
30 superior is civilised life, where feelings, taste, and intellect find abundant nourishment, to the spiritual sterility of half-savage existence, even though it be

passed in the garden of Eden. The superiority of the bleak north to tropical regions, however, is only in their social aspect, for I hold to the opinion that although humanity can reach an advanced state of culture only by battling with the inclemencies of nature in high latitudes, it is under the equator alone that the perfect race of the future will attain to complete fruition of man's beautiful heritage, the earth.

The following day, having no wind, we drifted out of the mouth of the Pará with the current of fresh water 10 that is poured from the mouth of the river, and in twenty-four hours advanced in this way seventy miles on our road. On the sixth of June, when about four hundred miles from the mouth of the main Amazons, we passed numerous patches of floating grass mingled with tree-trunks and withered foliage. Amongst these masses I espied many fruits of a palm peculiar to the Amazons; this was the last I saw of the Great River.



NOTES

1. The cicadas are stout-bodied insects, the males of which produce a loud singing noise, due to the vibration of a membrane.

2. In the case of our glow-worm, a phosphorescent light is emitted from the abdomen of the female, which is generally wingless. The fireflies of the tropics belong to a different genus, in which light is emitted (sometimes by both sexes) from the thorax. Small print may be read by the combined light of a few of these beetles.

3. Bates, Wallace, and other explorers speak frequently of the temporary disappointment of the traveller on his first visit to the tropical jungle.

4. The tanagers, which are exclusively American, are chiefly remarkable for their gay—sometimes even gorgeous—colours. In another place Bates speaks of “their flame-coloured liveries lighting up the masses of dark-green foliage.”

5. The name “gecko” is an imitation of the creature’s cry. As in the case of our cuckoo, this is an instance of ‘onomatopœia.’ (See also note 7.)

6. Saüba is the South-American Indian name for the leaf-cutting ant, sometimes called the “parasol-ant,” apparently from the way in which it carries the leaf it has cut.

7. Bates explains later that the name of this bird is an imitation of its cry; this is another instance of “onomatopœia,” already mentioned in note 5. Other illustrations are afforded by the Tanana cricket, and the Maracana parrot, described in later chapters. Among our own birds, the seamew and the kittiwake and the gowk (a provincial name for the cuckoo) are further examples.

8. Von Martius, a German botanist and traveller, ascended the Amazon about 1820. He compiled a Flora of Brazil, and wrote a monograph on palms.

9. Caoutchouc (pronounced koochook) is derived from the native South-American word *cahuchu*. The principal indiarubber tree of the Amazon region is the *Siphonia elastica*.

10. The *mimosæ* are a large genus of leguminous plants, whose leaves are pinnate or feather-shaped. The *Mimosa pudica* is the “sensitive plant” of our hot-houses.

11. Alexander von Humboldt, German naturalist and traveller, made his famous expedition to tropical America in 1799-1804. (See list of books at the end of these notes.)

12. Quito, the capital of the Republic of Ecuador, lies on a plateau less than 120 miles from the Pacific.

13. El Dorado was the name given to a supposed country, rich in gold and jewels, which the Indians and early Spanish explorers believed to exist in the New World.

14. The *Amazons* were a brave race of female warriors frequently mentioned in Greek mythology.

15. Fountain, in his work on the Amazon (see list of books at the end) states (p. 297) that he went to Ega on purpose to ascertain if Bates's visit was still remembered by the people there. "They had never heard of him or of any other Englishman."

16. The name *marmoset* comes from the French *marmouset*, a grotesque figure. As such figures were often carved out of marble, the derivation from *marmor* is thus explained. The *Midas argentatus* is not the species now called the silver marmoset, but *Hapale melanura*, the black-tailed marmoset.

17. The Spider-monkeys are so-called from their long limbs, resembling spiders' legs. The thumb is wanting, apparently because it is useless when the hands are employed to swing the body from branch to branch. These creatures can suspend themselves from a branch by the tail alone. No African monkey can do so. On the other hand, no American monkey has cheek-pouches.

18. *Caiarara* means "macaw-headed." These monkeys are also called *Capuchins*, from the cowl-like appearance of the hair on the head.

19. This is the *Uakari* of the natives. The bald *Uakari*, here mentioned, is only found near Ega.

20. The full name *Macaco Barrigudo* signifies "big-bellied monkey," and alludes to the bulky build as contrasted with the slender figure of the Spider-monkey. This is the woolly monkey, named *Lagothrix Humboldti* from its discoverer.

21. The marmoset referred to here as the only migrating primate is *Hapale pygmaea*. The silky marmoset has also, however, been found in Mexico.

22. Bates does not imply here that the shrews of Europe are marsupials; but that the opossum resembles the shrew in its insect diet; indeed, some of the American opossums are known as opossum-shrews. In some species of opossum the pouch is wanting; the young are then carried on the back of the mother, even when she climbs trees; supporting themselves by twining their tails round the tail of their parent.

23. The sea-cow, or *manatus*, of the Amazon, though it is an

aquatic mammal, like the whale, the porpoise, or the dolphin, does not belong to the order *Cetaceae*. Differing from the creatures just named in structure and origin, it is placed in the order *Sirenia*, so named from the mermaid-like appearance of the female, as she raises herself out of the water, to suckle her young one, clasping it to her breast with one flipper, while swimming with the other. The name *manatus* is due to the hand-like action of the flipper. These creatures browse beneath the surface on aquatic plants and fresh-water grasses. Of five or six specimens seen by Wallace, not one exceeded eight feet in length. The teats are close to, and behind, the base of the fins.

24. There does not appear to be a distinct species known as the black jaguar; the colour varies considerably, and some individuals are quite black. Wallace states that the black variety is generally rarer than the other; though in a particular region (as Bates says is the case at Ega) it may be more abundant. Wallace describes an encounter he had with a "jet-black" jaguar. Having no ball in his gun, he "stood silently gazing." The animal "paused and gazed at him," and then "walked steadily on."

25. The vampire-bat derives its name from the "vampire," the spectre or ghost of dead wizards or witches. This was supposed (by the Slav tribes of the Lower Danube) to leave the grave at night and suck the blood of human beings.

26. The "barbets" occupy a position midway between the woodpeckers and the toucans. Their beaks are often notched, like those of the toucans.

27. In the Amazon lowlands are found the white heron, the blue heron, the peacock heron, the egret, the bittern, and the roseate spoonbill. The stork mentioned by Bates as four and a half feet high, is the *jabiru*, sometimes seen in the London Zoological Gardens.

28. These are the *jacanas*, which resemble our coot in having a bald shield above the bill, and our water-hen in having long toes, which enable them to walk over the leaves of water-lilies.

29. In the same way, in this country, we may often see a small bird persistently attacking a hovering kestrel.

30. This is the night-jar or fern-owl. There was a tradition that this bird sucked the milk of goats.

31. Our own night-jar does the same.

32. Our song-thrush often ends a sweet strain in a similarly disappointing manner.

33. Wallace's description of the making of a blow-pipe is different. He states that the pith is cleared out with a rod (of smaller size) cut from another palm. Waterton, in his *Wanderings in South America*, describes still another method. J. G.

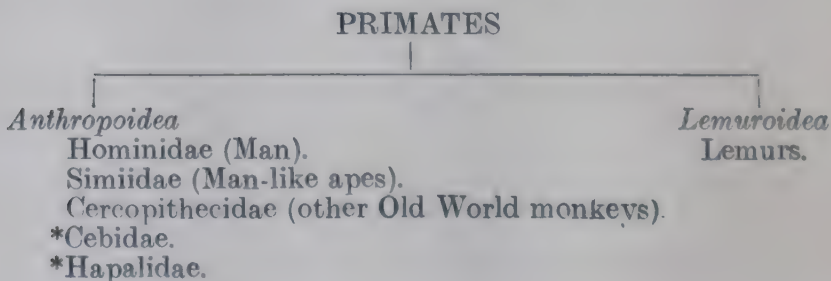
Wood, in his notes to Waterton's work, explains that there are apparently several different ways of making the instrument. Waterton gave Wood a specimen eleven feet long.

34. The name of this poison is variously spelt—*urari*, *curari*, *wourali*, and (e.g. in Tennyson's "Children's Hospital") *oorali*. It is a resinous product, used by South American Indians to poison their arrows; used also in physiological experiments to paralyse the motor-nerves. Waterton, who made an expedition into Guiana for the express purpose of obtaining information about this poison, hoped that it might be useful as an antidote in cases of tetanus and hydrophobia. It is not, however, officially recognised in the Pharmacopeia.

NOTE ON THE MONKEYS

Bates mentions in detail nearly forty species of monkeys which he found in the Amazon region. He is careful to point out clearly that they all belong to two families: the *Cebidae* (including the Spider-monkeys, Howlers, etc.); and the *Hapalidae* (comprising the Marmosets). These two families are peculiar to the New World, and are placed lower in the scheme of the Animal Kingdom than the apes and monkeys of the Old World. Their special characteristics are these: (1) Most of them have prehensile tails; if we find a monkey hanging by its tail, we may be sure that it is American. (2) The *Cebidae* have thirty-six teeth as compared with thirty-two in man and in the apes and monkeys of the Old World. (3) No American monkeys have the callosities on the buttocks, familiar in the case of Old World species. (4) No American monkey has cheek-pouches.

Speaking generally, the American monkeys are much smaller than those of the Old World; they are specially adapted for an arboreal life, spending practically the whole of their time in the tree-tops; their cries are much louder than those of monkeys of the other continents. Their position in the scheme of the Animal Kingdom may be seen from the following simplified table:



For the sake of clearness, the genera of the South American monkeys are given here, and after each (in brackets) are named species mentioned by Bates :

A. Family CEBIDAE : Nine genera, viz. *Cebus* (Caiaara or Capuchin monkeys) ; *Lagothrix* (Barrigudo, Humboldt's woolly monkey) ; *Ateles* (Spider monkeys) ; *Nyctipithecus* (Nocturnal owl-faced monkeys) ; *Chrysothrix* (Squirrel monkeys) ; *Callithrix* (Titi monkeys, Whaiápu-sai) ; *Pithecius* (Couxio, Humboldt's Saki, etc.) ; *Uakaria* (Scarlet-faced monkeys) ; *Myctes* (Howlers).

B. Family HAPALIDAE : Two genera, viz. *Hapale* (*H. jacchus*, *H. melanura*, *H. pygmaea*) ; *Midas* (*M. ursulus*, *M. rufoniger*, *M. leoninus*, etc.).

GLOSSARY

- analogy** : similarity, likeness.
anthropoid : manlike (applied to the higher apes).
aquatic : living in water.
arboreal : living in trees.
assimilated : made similar to.
avalanche : the sliding down of a mass of material.
aviary : a large cage for birds.
campos : in Brazil = patches in the forest which are nearly or quite bare of trees.
capricious : changeable, fickle, uncertain.
carafe : a water-bottle or decanter.
carnivorous : feeding on flesh.
cycle : here = a succession of events.
diabolical : devilish.
digitated : divided or notched, so as to resemble fingers
dilapidated : worn out.
entomology : the study of insect life.
epiphytous : an epiphyte is a plant which grows upon another plant, but does not derive nourishment from it.
equatorial : on or near the equator.
excrescence : swelling, protuberance.
fauna : animal life.
farinha : a preparation of ground maize or other seeds.
flexuous : supple, easily bent.
frugivorous : fruit-eating.
galley : here = the stove on the boat.
gizzard : the second stomach of a bird, furnished with strong muscles for grinding food.
gregarious : collecting in flocks.
hyacinthine : here referring to the deep blue of the feathers, resembling the colour of the hyacinth.
hypocritical : dissembling, acting under false pretences.
imp : here = a mischievous creature, a "little devil."
impish : mischievous, like small devils. For the application to vampires here, see note 25.

- insectivorous** : feeding upon insects.
intractable : not easily tamed.
invertebrate : having no back-bone.
lappet : flap, or pendant.
liana : a climbing, twining plant (from French *lier*, to bind).
lobe : a rounded projection.
mammalia : the highest class of vertebrate animals, which suckle their young.
mango : a tropical tree, bearing a luscious, slightly acid fruit, in the form of a drupe.
marauder : a plunderer.
marsupial : furnished with a pouch (marsupium) in which the young are carried in the early stages.
missile : something thrown.
mitigated : rendered milder or more tolerable.
moulting : the periodical shedding or casting of feathers.
ochre-coloured : brownish-yellow.
offal : the waste parts that are thrown away.
ornithology : the study of bird life.
pelerine : a narrow cape with ends coming to a point in front.
physiognomy : the features, the face.
prehensile : grasping, holding on.
probe : to test, try, examine.
proboscis : a long flexible snout.
pumice : volcanic lava having a spongy structure.
querulous : complaining.
remasticate : to chew over again.
seriatim : one after the other.
spanking : (of a breeze) fresh, strong. (From root meaning "to move quickly.")
stridulation : a harsh, shrill sound.
sweltering : sultry, suffocating with heat.
terrestrial : living on the ground.
trachea : the wind-pipe.
trituration : grinding small.
turbid : muddy.
versatility : here = variety, variation.
vertebrate : having a back-bone.
zenith : the point immediately overhead.

QUESTIONS AND SUGGESTED SUBJECTS FOR ESSAYS

1. Write an essay on "The adaptation of the fauna of South America, (carnivora, monkeys, sloths, beetles, etc.) to an arboreal life."

2. The fact that the South American monkeys have prehensile tails seems to support the theory that these animals have been gradually fitted for an arboreal life. How then do you account for the fact that the Scarlet-faced monkeys, which are arboreal, have no tails at all, and that some of the other tree-dwelling monkeys have tails that are not prehensile?

3. What may be the use of non-prehensile tails: *e.g.* in the case of the marmosets? Illustrate from other animals.

4. From what plant is the curare poison obtained? Write about Waterton's experiment and discoveries in connection with this drug. Discuss its use in cases of hydrophobia, tetanus, and in experiments in vivisection. Quote Tennyson's reference to it.

5. There is some difference of opinion as to which bats suck the blood of human beings. Discuss this question. How do you account for the fact that the infliction of the wound is always painless? Recount the experiences of Bates, Wallace, and Waterton in this connection.

6. How do you explain the fact that the Great Ant-eater has no teeth? What is the use of its strong claws? How could it fight with a dog, as described by Bates?

7. Give your own estimate of the possibilities of the development of the Amazon region. What are the difficulties that stand in the way (a) of the timber trade: (b) of the rubber industry?

8. Classify the apes and monkeys of the Old World and the New. Classify the monkeys mentioned by Bates. How would you account for the fact that not even fossil remains of the American monkeys are found in the Old World? Why should there be no monkeys in Australia?

9. What differences did Bates detect between the fauna of the Upper and the Lower Amazon?

10. Bates's book has been described as "the best work of natural history of travel published in England." Discuss this estimate. Compare Bates's methods of observation and his descriptive style with those of Gilbert White. In what respects

would you consider Bates's narrative superior to that of Wallace or Waterton?

11. Write short essays on the "Ants," "Wasps," "Humming-birds," and "Aquatic mammals" of the Amazon region.

12. Quote passages from Bates's book to shew how constantly his mind was working on the question of the gradual adaptation of living creatures to their circumstances and environment.

13. In his review of Waterton's *Wanderings in South America* (*Edinburgh Review*, 1825) Sidney Smith wrote: "The sloth moves suspended, rests suspended, sleeps suspended, and passes his life in a state of suspense—like a young clergyman distantly related to a bishop." Comment upon this description from your knowledge of the creature's habits.

14. W. H. Hudson, in his *Naturalist in La Plata*, says: "Humming birds are perhaps the loveliest things in nature." Give your reasons for agreeing or disagreeing with this statement.

15. In the same book the author has a chapter entitled "Nature's Nightlights." Give some account of these. Hudson distinguishes between the fireflies of La Plata and those of the Amazon. Wherein lies the difference?

16. For a poem: Evening in the Forest.

17. For an essay: Rivers of the Old World and the New—their attractions compared.

18. For a Parable from Nature (in verse or prose): A Turtle, an Alligator and a Boa, discuss the amenities of life.

19. Construct sentences in which the following words are used, in such a way as to illustrate their meaning: traverse, luxuriance, vicinity, rigid, rudimentary, research, indolence, intermediate, capricious, transit, plaintive.

20. Form substantives from the following: tenacious, hospitable, diverse, recur, adapt, perpetual.

21. Give the exact meaning of the following words, with the help of their derivation: eventually, primeval, parasite, monopolise, indented, lilliputian, suburban, marauder, excrescence, dilate, vertically, myriads, voluminous, dexterous.

BOOKS ON THE AMAZON

There is a *Life of Bates* by Edward Clodd (1892); a sketch of his Life is given in the Supplement to the Dictionary of National Biography; and he is mentioned in Darwin's *Life* (ii. 243). The fifth edition of *A Naturalist on the Amazons* (John Murray), appeared, with forty wood-block illustrations, in 1884. The full text, with Bates's original preface, and an Introduction by Charles Darwin, has recently been reprinted in the "Everyman" series.

Works on the Amazon fall into several classes, according as the object of the explorer is geographical discovery, botanical or zoological or geological research, ethnological study, or the opening up and exploiting of facilities for trade in rubber or other commodities. The following list is by no means exhaustive, and should be supplemented by a number of recent papers in the Proceedings of Geographical and other societies in Europe and America, too numerous to be even catalogued here.

1. An edition of Humboldt's *Voyage to the Equinoctial Regions of the New Continent*, translated by Ross, appeared in 1852.

2. The Hakluyt Society's volume (1859), edited by Clements Markham, deals with Expeditions into the valley of the Amazon in 1539, 1540 (by Orellana), and 1639.

3. *Travels on the Amazon and Rio Negro*, by Alfred Russel Wallace, 1853.

4. *The Andes and the Amazon*, by James Orton (Smithsonian Institute's Expedition), 1870.

5. *The Amazon and Madeira Rivers*, by Franz Keller, 1874. (Well illustrated.)

6. *South America*, by Lord Bryce, 1912.

7. *Across Unknown South America*, by A. H. Savage Landor, 1913. (Contains a short account of the Amazon.)

8. *The Lower Amazon*, by A. Lange, 1914. (With many illustrations, and references to the rubber industry.)

9. *The Upper Reaches of the Amazon*, by J. T. Woodruffe, 1914. (Shews H.M.S. *Pelorus* anchored at Iquitos in 1907. Also deals with rubber.)

10. *The River Amazon from its Sources to the Sea*, by Paul Fountain, 1914. (Very clear.)

11. *The North-West Amazons*, by T. Whiffen, 1915. (Deals with Ethnological questions.)

Waterton's *Wanderings in South America* (1825), though not dealing directly with the Amazon, may also be read with advantage in connection with this work.

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